

Seat No.

[62/A-21]

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SARDAR PATEL UNIVERSITY

M.Sc.Semester-III: Analytical/Physical/Industrial Polymer/Inorganic  
Chemistry Examination (CBCS)

October-2016, Friday, Date: 28.10.2016

Time: 2.00 p.m. to 5.00 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** Answer by highlighting the appropriate option **[08]**
- i) Which of the following is not example of adsorption chromatography?  
a) GSC b) IEC  
c) TLC d) LSC
- ii) HETP =  $L/n$  where n is \_\_\_\_\_.  
a) number of theoretical plate b) Constant  
c) number of equilibrium d) number of rounds
- iii) Which of the following is not mass sensitive detector?  
a) FID b) TID  
c) TCD d) FPD
- iv) Full form of RMR  
a) Relative Molar Response b) Reaction Molar Ratio  
c) Ratio of Molar Response d) Relative Molar Reaction
- v) Syringe pump does not use for \_\_\_\_\_.  
a) elution b) frontal analysis  
c) isocratic elution d) gradient elution
- vi) Capacity of resin depends on \_\_\_\_\_.  
a) nature of functional groups b) number of functional groups  
c) rigidity d) porosity
- vii) TLC technique is a \_\_\_\_\_ of HPLC.  
a) Plan b) Pilot plan  
c) Map d) Verification
- viii) Which of the following techniques useful for separate similar m/e ratio but different size?  
a) GC-MS b) SFC  
c) Capillary electrophoresis d) Paper electrophoresis

**Q.2**

- Attempt any **SEVEN** **[14]**
- i) Discuss the factor effecting the column efficiency.  
ii) Explain normal and reverse phase chromatography.  
iii) Explain briefly the importance of SFC.  
iv) Give the classification of chromatography.  
v) Give the comparison between TLC and HPTLC.  
vi) Discuss the criteria in selecting an inert solid support for GLC.  
vii) Discuss the factor favoring solvent extraction.  
viii) Give the introductory note on electrophoresis.  
ix) Explain the detection of sample in IEC.

- Q.3 a) Discuss the various type of paper chromatography and it applications. [06]  
b) Discuss the detail account of adsorption and partition chromatography. [06]

OR

- b) How to prepare TLC plate? Discuss its development techniques and applications.  
Q.4 a) Discuss important features of supercritical fluid. How it is complimentary to GC and HPLC? [06]  
b) Describe the principle of solvent extraction and its applications. [06]

OR

- b) Explain equilibrium techniques of solvent extraction.  
Q.5 a) Discuss 'Rate theory' and Van-Deemeter equation. [06]  
b) **Answer the following** [06]  
i) Explain the ECD and its characteristics.  
ii) Discuss the relative retention time and resolution. What length of column is necessary to produce a resolution of 1 between two solute peaks? The distribution co-efficient for two solutes are 1.83 and 1.97 respectively. The volume of stationary phase and mobile phase are 74.1 mL. and 7.6 mL. respectively and height equivalent to a theoretical plate for column is 0.174 cm. Explain base line resolution.

OR

- b) Draw the schematic of HPLC and discuss the function of degasser, guard and analyte column.  
Q.6 a) Discuss the principle of IEC. Explain various types of ion exchanger. Discuss in detail the applications of IEC. [06]  
b) **Answer the following** [06]  
i) Discuss the swelling of resin and its properties.  
ii) 200 mL. sample of hard water is passed through cation exchange column in  $H^+$  form the column is eluted with water and eluent is titrated with 0.0558 N NaOH. If 22.3 mL. NaOH is required to reach the end point. Calculate the hardness of water in ppm of  $CaCO_3$ . (At.Wt.:Ca = 40; C=12; O=16)

OR

- b) Elaborate continuous flow and paper electrophoresis with schematic.

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(2)