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Total No. of Pages : 02

Total No. of Questions : 19

**M.Sc. (Chemistry) PIT (2015 to 2017) (Sem.-3)**  
**CHROMATOGRAPHY AND SEPARATION TECHNIQUES**

Subject Code : CHL-505

Paper ID : [74893]

Time : 3 Hrs.

Max. Marks : 70

**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SIX questions carrying FIVE marks each and students have to attempt ALL questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

- Q1. What is chromatogram? What physical property is plotted on y and x axes?
- Q2. What is the mobile and stationary phase in gas-liquid chromatography?
- Q3. What is meant by selectivity factor? What are its' units?
- Q4. Define supercritical fluid and critical temperature.
- Q5. What is the role of gas in gas chromatography? Why is it usually called carrier gas?
- Q6. Define gradient elution.
- Q7. Define retardation factor in chromatography.
- Q8. How retention time of a solute can be modulated?
- Q9. Define solute-property detector in HPLC.
- Q10. What is more reliable to measure peak height or peak area? Explain.

**SECTION-B**

- Q11. Describe a method to determine number of plates in a column.
- Q12. In gas-liquid chromatography, what are the desirable properties of immobilized liquid? Give one example of polar and non-polar immobilized liquid used in construction of stationary phase.
- Q13. Draw a neat and well-labelled schematic of thermal conductivity detector and discuss its' working.
- Q14. What do you mean by reverse-phase HPLC? What type of column and mobile phase are used in this chromatography? What kind of mixtures can be separated by reverse-phase HPLC?
- Q15. Describe the effect of pressure on supercritical fluid Chromatogram. Differentiate between on-line and off-line processes in supercritical fluid extraction.
- Q16. What do you mean by exclusion limit and permeation limit? What are the advantages and disadvantages of silica particles as column packing material?

**SECTION-C**

- Q17. Draw a well-labelled block diagram of instrumentation of a gas chromatograph. Discuss the role of each part. Define tailing, and fronting. How does tailing and fronting affect the efficiency of column? How can these be avoided?
- Q18. Discuss the construction and working of supercritical fluid chromatograph. What is the role of each component? What property of supercritical fluid are important in chromatography?
- Q19. I. For supercritical carbon dioxide, predict the effect that the following changes will have on elution time in an experiment :
- a) Increasing the flow rate (at constant temperature and pressure)
  - b) Increasing the pressure (at constant temperature and flow rate)
  - c) Increasing the temperature (at constant pressure and flow rate)
- II. How are analytes usually recovered after a supercritical fluid extraction?