

**UNIVERSITY OF ESWATINI**  
**FINAL EXAMINATION – 2019**

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**TITLE OF PAPER** : Separation Methods in Chemistry

**COURSE NUMBER** : CHE 606

**TIME** : Three Hours

**INSTRUCTIONS:**

Answer any four (4) questions of the six questions and every question holds 25 marks. NB: all questions are to be answered in a separate answer sheet.

### Question 1

- a) Explain in detail, all the critical parameters in normal phase and reverse phase liquid column chromatography as a tool in separation of mixtures in chemistry. (25)

### Question 2

- b) Discuss Gas chromatography (GC) and HPLC by comparing their similarity and difference. as methods of separating mixtures in chemistry. (10)
- c) What are the requirements that a stationary phase should meet so that it will be used in separation techniques in Chemistry? (10)
- d) What are the basic principles of the separation techniques? (5)

### Question 3

- a) Describe the principles of ion exchange chromatography (IEC). What factors affect IEC? (10) and what are the common materials used for ion exchange chromatography? (5)
- b) Indicate some of the limitations of Ion-Exchange Chromatography? (5)
- c) How does temperature and pH affect the efficiency of IEC? (5)

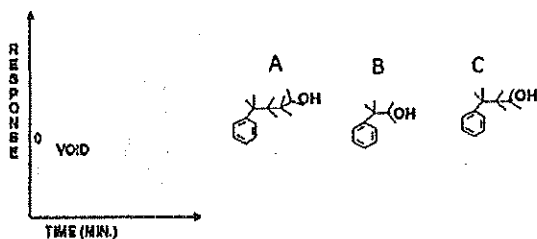
### Question 4

- a) HPLC uses both isocratic as well as gradient solvent systems and what is the difference between the two solvent systems and when are they applied? (10)
- b) TLC is a chromatographic method which is highly applied in synthesis and natural products chemistry. What do you think is the reason for this universal use? Explain. (10)
- c) What does R<sub>f</sub> value indicate in the use of chromatography? (5)

### Question 5

- d) What are the conditions that a stationary phase should meet so that it will be used in separation techniques? (10)
- e) What are the conditions required for improving separation and resolution in reversed phase chromatography? (9)

- f) What is the elution order of A, B, and C in a normal phase chromatography? Indicate which peak belongs to which compound on the given chromatogram and explain your reasoning. (6 points)



### Question 6

- What are the most commonly used detectors in chromatography? (9)
- Which detector method is popularly used in chromatography? Why? (10)
- Which detector method is more sensitive and if not used why not? (6)