NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF APPLIED CHEMISTRY
BACHELOR OF SCIENCE HONOURS DEGREE
END OF SECOND SEMESTER EXAMINATIONS – MAY 2011
CHROMATOGRAPHIC SEPARATIONS – SCH 4292
TIME: 3 HOURS

INSTRUCTIONS TO CANDIDATES
Answer **ANY FOUR (4)** questions out of **FIVE (5)** questions provided.
Each question carries 25 marks.

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1. (a) Define the following terms as used in Chromatography.

(i) elution [2 marks]
(ii) mobile phase [2 marks]
(iii) stationery phase [2 marks]
(iv) retention time [2 marks]
(v) column resolution [2 marks]

(b) Compound A migrates 7.6 cm from its point of application on a thin-layer chromatographic plate, whereas in the same time the solvent front migrates 16.2 cm beyond the point of sample application.

(i) Calculate R_f for compound A.
(ii) On an identical plate, the solvent front has moved 14.3 cm beyond the point of sample application; where should compound *A* be located on this plate?

[10 marks]

(c) If you want to produce maximum activity on an AI_2O_3 adsorbent, how do you treat it?

[5 marks]

2. (a) Define the following terms:

(i) sparging [2 marks]
(ii) reversed-phase packing [2 marks]
(iii) normal-phase packing [2 marks]
(iv) gel-filtration [2 marks]

(b) List the differences in properties and roles of the mobile phase in gas and liquid chromatography. How do these differences influence the characteristics of the two methods? [17 marks]

3. (a) With the aid of a diagram, describe the following columns which are used in Gas Chromatography? Also indicate the conditions under which each is used.

(i) Capillary column [10 marks]
(ii) Packed column [10 marks]

(b) What is resolution as used in separation chromatography? [5 marks]

4. (a) How can the use of temperature programming improve resolution in Gas Chromatography? [12 marks]

(b) In HPLC how is gradient elution used to identify optimal conditions for separation of several compounds? [13 marks]

5. (a) How do instruments for supercritical fluid chromatography differ from those for:

(i) HPLC [10 marks]
(ii) GC [10 marks]

(b) Describe the effect of pressure on super critical fluid chromatograms. [5 marks]

END OF QUESTION PAPER!!!