EASTERN UNIVERSITY, SRI LANKA

FIRST SEMESTER SECONDEXAMINATION IN SCIENCE

2009/2010 (JUNE – JULY 2011)

CH 202: ANALYTICAL CHEMISTRY

(Proper & Repeat)

Answer all questions

Time Allowed: One hour

1. (a) What is meant by the phrase "solvent Extraction"? List the advantages of using solvent extraction in the analytical chemistry **20 marks**

(b) Outline the theory behind in the solvent extraction process **15 marks**

(c) Consider a separation of week acid HA by solvent extraction. Suppose K_a is the ionization constant of week acid and K_D and D are the partition coefficient (organic/aqueous phase) and distribution ratio respectively. Derive expression to relate the distribution ratio D in terms with K_a, K_D and $[H^+]$ as indicated below.

$$D = \frac{K_D}{1 + \frac{K_a}{[H^+]}}$$

25 marks

(d) Chelate complex formation is a method to extract certain metals in the solvent extraction process.

(i) Give two chelating agents with structures as examples to indicate how chelating agents help selectively to extract analyte metal suppose the sample contains many metals as interference

20 marks

(ii) Outline briefly the factors affect the chelate formation **20 marks**

2. (a) Draw a fully labeled diagram to show the important components of gas chromatography. 20 ma

(b) Briefly explain the functions of the components 20 ma

(c) Explain the following terms

(i) Temperature programmed elution 15 ma

(ii) Give the advantages of derivatives preparation of sample prior to the chromatographic analysis 15 ma

(iii) Retention time 15 ma

(d) Suppose an analytical sample that contains three components **A**, **B** and **C** in the ratio of 5 and the retention time t_A, t_B, and t_C respectively draw a rough sketch of the gas chromatog for these samples.

(Assume the retention time $t_A < t_C < t_B$) 15 ma