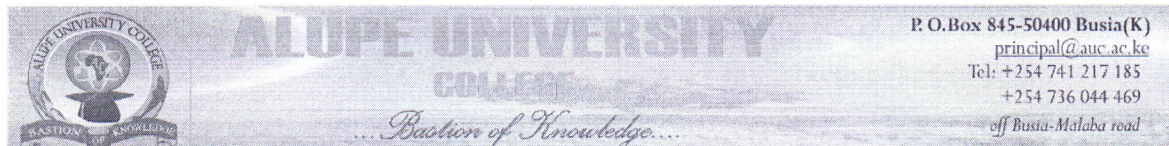




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OFFICE OF THE DEPUTY PRINCIPAL
ACADEMICS, STUDENT AFFAIRS AND RESEARCH

UNIVERSITY EXAMINATIONS

2018/2019 ACADEMIC YEAR

FIRST YEAR FIRST SEMESTER REGULAR EXAMINATION

FOR THE DEGREE OF BACHELOR OF EDUCATION SCIENCE

COURSE CODE: CHE 112e
COURSE TITLE: INTRODUCTION TO ANALYTICAL
CHEMISTRY

DATE: 13TH DECEMBER, 2018

TIME: 2.00 PM – 5.00 PM

INSTRUCTION TO CANDIDATES

- SEE INSIDE

THIS PAPER CONSISTS OF 4 PRINTED PAGES

PLEASE TURN OVER

CHE 112e: INTRODUCTION TO ANALYTICAL CHEMISTRY**STREAM: BED (Science)****DURATION: 3 Hours**

INSTRUCTIONS TO CANDIDATES

- i. Answer **ALL** questions from **SECTION A** and any other **THREE** questions from **SECTION B**.
- ii. Diagrams may be used whenever they serve to illustrate the answer.
- iii. Do not write on the question paper.

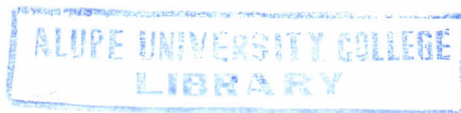
SECTION A (24 MARKS)**Question One**

- a) Discuss briefly the two types of chemical analysis. (3 Marks)
- b) Differentiate between assay and quality control. (2 Marks)
- c) State three factors which must be taken into account when selecting an appropriate method of analysis. (3 Marks)
- d) Discuss the four steps involved in sample preparation process. (4 Marks)

Question Two

- a) Outline four ways to detect and correct systematic errors. (4 Marks)
- b) The result of an analysis is 29.74 μg compared to the true value of 30.15 μg . Calculate the relative error in part per hundred and part per thousand. (3 Marks)
- c) Find the t-test value for the following two sets of data: (5 Marks)

x_1	9	10	11	12
x_2	2	4	6	8

SECTION B (36 MARKS)**Question Three**

- a) Define the following terms;
- i. Precision (1 Mark)
 - ii. Accuracy (1 Mark)
 - iii. Variance (1 Mark)
- b) Differentiate between student's t-test and f-test. (2 Marks)
- c) State three major ways by which correlation is carried out. (3 Marks)
- d) Write short notes on the following;
- i. gravimetric analysis (1 Mark)
 - ii. titration analysis (1 Mark)
 - iii. potentiometric analysis (2 Marks)

Question Four

- a) Briefly describe the steps followed in gravimetric analysis. (6 Marks)
- b) Calculate the solubility of AgCl ($K_{sp} = 1.0 \times 10^{-10}$) in 0.1 M NaNO₃. The activity coefficients for silver and chloride ions are 0.75 and 0.76, respectively. (3 Marks)
- c) Define the following terms as used in titrimetric analysis;
- i. primary standard (1 Mark)
 - ii. equivalent point (1 Mark)
 - iii. blank titration (1 Mark)

Question Five

- a) State four characteristics of a standard solution. (4 Marks)
- b) A 20.0 cm³ solution of sulphuric acid was titrated with a standardized solution of 0.0500 mol/dm³ potassium hydroxide. The acid required 36.0 cm³ of the alkali KOH for neutralisation. Calculate the concentration of the acid? (3 Marks)
- c) Differentiate between strong and weak acids. (2 Marks)
- d) Calculate the hydrogen ion concentration and pH of a 1.5 mol dm⁻³ solution of sulphuric acid. (3 Marks)

Question Six

- a) 20.0 cm³ of a sulphuric acid solution was titrated with a standardised solution of 0.0500 mol/dm³ potassium hydroxide. The acid required 36.0 cm³ of the alkali KOH for neutralisation. Calculate the concentration of the acid? (3 Marks)
- b) Differentiate between strong and weak acids. (2 Marks)
- d. Calculate the hydrogen ion concentration and pH of a 1.5 mol dm⁻³ solution of sulphuric acid. (3 Marks)
- c) Discuss the two major problems encountered during thin layer chromatography process. (4 Marks)

Question Seven

- a) A 0.10M solution of formic acid, HCOOH, has a pH of 2.38 at 25°C. Calculate the K_a of formic acid. (5 Marks)
- b) Briefly discuss the following terms;
- i. Permanganometry,
 - ii. Cerimetry and
 - iii. Bromatometry (5 Marks)
- c) Differentiate between instrumental and operative error. (2 Marks)
