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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 x 10^{-10}) in 0.1 M $NaNO_3$. 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 cm^3 solution of sulphuric acid was titrated with a standardized solution of 0.0500 mol/dm^3 potassium hydroxide. The acid required 36.0 cm^3 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 cm^3 of a sulphuric acid solution was titrated with a standardised solution of 0.0500 mol/dm^3 potassium hydroxide. The acid required 36.0 cm^3 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)

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