UNIVERSITY EXAMINATIONS
2022/2023 ACADEMIC YEAR

FIRST YEAR SECOND SEMESTER
SPECIAL/SUPPLEMENTARY EXAMINATIONS

FOR THE DEGREE OF BED SCIENCE, BSC CHEMISTRY AND BSC BIOLOGY,

COURSE CODE: SCH 122

COURSE TITLE: INTRODUCTION TO ANALYTICAL CHEMISTRY

DATE: 9/8/2023 **TIME: 11:00-1:00PM**

INSTRUCTIONS TO CANDIDATES:

- Answer **Question ONE (Compulsory)** and any other **TWO (2)** questions
- Indicate answered questions on the front cover of your answer booklet
- Start each question on a new page and make sure the question's number is written on each page

TIME: 2 Hours

Question 1 [30 Marks]

i. Differentiate between direct and indirect titration [4 Marks]

ii. Describe the role of an analytical chemist [2 Marks]

iii. Two resistances R1 = (100 ± 3) Ω, R2 = (150 ± 2) Ω, are connected in series. What is their equivalent resistance? [6 Marks]

iv. Sketch a titration curve of the titration of a strong acid with a strong base and label the parts [6 Marks]

v. Highlight the equations employed to determine the equation for linear functions [4 Marks]

vi. Discuss the sources of error observed in analytical measurements [6 Marks]

vii. Describe the acronym LSE and its application in analytical measurements [2 Marks]

Question 2 [20 Marks]

In an experiment the product yield is calculated be the relation $P = \frac{a^3 b^2}{cd}$ between the reactants a,b,c and d. Determine the product yield when the reactant concentrations are 20.2 ± 5%, 70.3 ± 4%, 42.1 ± 2% and 38.6 ± 1% for a,b,c and d respectively.

Question 3 [20 Marks]

A Volhard titration was used to determine the %w/w I^- in a 0.6712-g sample. After precipitating with 50.00 mL of 0.05619 M $AgNO_3$, the remaining silver was back titrated with 0.05322 M KSCN, requiring 35.14 mL to reach the end point.

Determine the %w/w I^- in the sample.

Question 4 [20 Marks]

Consider the data in the table

x	-5	-4	-3	-2	-1	0	1	2	3	4	5
y	7.9	2.8	1	-2	-3.3	-4.2	-4.4	-3.2	-2	-0.5	2.9

i. Graphically determine the x and y-intercepts [10 Marks]

ii. Use the method of least squares to the determine the equation for the curve and use it to determine the intercepts. [7 Marks]

iii. Determine the percentage error in the x and y intercepts [3 Marks]

Question 5 [20 Marks]

Construct a titration curve for the titration of 50.0 mL of 0.100 M HCl with 25.0 mL of 0.200M NaOH.