MURANG'A UNIVERSITY COLLEGE

(A constituent college of Jomo Kenyatta University of Agriculture and Technology)

SCHOOL OF PURE AND APPLIED SCIENCES

UNIVERSITY EXAMINATIONS 2015/2016 ACADEMIC YEAR

AS/SLT/14C

UNIT CODE ASLT 0202 CHEMISTRY TECHNIQUES

END TERM THREE 2015 EXAM

Date: 16th November 2015 **Time: 3Hours**

INSTRUCTIONS, ANSWER ALL QUESTIONS IN BOTH SECTIONS

SECTION A

1. Calculate the mass of sodium nitrate required to prepare 250cm^3 of solution whose concentration is 100 ppm with respect to sodium. Na=23, N=14, O=16 (4marks)
2. State **FOUR** properties of a wash liquid used in gravimetric analysis (4 marks)
3. Outline the preparation 125cm^3 of 0.25M Calcium carbonate, Ca=40, C==12, O=16. (4marks)
4. 4i. Calculate the number of faradays needed to produce 4g of magnesium when a current of 4A is passed through molten magnesium (Mg=24) (2 marks)

ii) Calculate the time taken for the 4g of magnesium to be produced in (i) above. (1F = 96500C)

(2 marks)

5 i. Calculate the pH of a 0.05M Hcl. (4marks)

ii. State any **TWO** causes of deviation from Beer-Lamberts law (2marks)

6. List **FOUR** ways of expressing the concentration of solutions

7. Outline the procedures involved in gravimetric analysis. (4 marks)

8. i. Define electrolysis (1 mark)

ii. State **THREE** factors that affect the products of electrolysis. (3marks)

9i. Define pH (1 mark)

ii. The dissociation constant, ka for acetic acid is $1.75x10^{-5}$. Calculate the pH of 0.1MCH_3CHOOH solution (3mrks)

10. Draw and describe the working of a **Soxhlet extractor**. (4 marks)

SECTION B

11 a. A solution containing 5mg in 250cm3 of compound X had a transmittance of 36.4% in a 1 cm cell at 525nm. If the RMM of X is 200, calculate its Molar absorptivity. (7marks)

b. The following data were obtained during the determination of certain drug by UV spectrophotometry.

Standard solution	Concentration (Mol dm^{-3})	% T
1	$40x10^{-5}$	17.9
2	$32x10^{-5}$	25.0
3	$24x10^{-5}$	35.7
4	$16x10^{-5}$	50.2
5	$8x10^{-5}$	70.8

i. Plot a graph of absorbance against concentration (8 marks)

ii. Obtain the concentration of a sample of the drug whose absorbance was0.55 in the same cell from the graph. (2 marks)

12a. 21.4g of hydrated sodium carbonate $Na_2 CO_3XH_2O$ was dissolved in water to make up a litre of solution. 25cm3 of this solution required 18.7cm3 of 0.2M standard hydrochloric acid for complete neutralization. Calculate the value of X. (16 marks)

iii. Name FOUR types of titrimetric analysis (4 marks)

13 a) Outline how to prepare 1000ppm potassium using pure $KMnO_4$

K=39, Mn=55, O= 16 (5marks)

c) From the above stock solution explain how to prepare:

i) 250cm3 of 100ppm- K. ii) 100cm3 of 0.25M (4marks)

b) A 150ppm solution of $K_2Cr_2O_7$ has a transmittance percentage of 85% in 3.4cm Cell. (Mw of $K_2Cr_2O_7$ = 294). Calculate the molar absorptivity of the solution. (5 marks)

c. State the distribution law (2 marks)

d. The distribution coefficient for compound X between water and chloroform is 6.4.

Calculate the fraction of X remaining in the water layer when 25ml portion are shaken with:

i. **One** 10 ml portion of chloroform,ii**. 4** succesive10ml portions of chloroform (4 marks)