PRESIDENT'S OFFICE

REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT

FORM FOUR MIDTERM EXAMINATION

032 **CHEMISTRY**

Time: 3:00 Hours

Instructions:

1. This paper consists of Section **A**, **B** and **C** with a total of eleven (11) questions.
2. Answer all questions in sections **A** and **B**, and only two questions from section **C**.
3. Write your examination number on every page of your answer sheet.
4. Non-programmable calculators are allowed in the examination room.
5. The following constants may be used.

Atomic masses: H=1, O=16, C=12, C=12, N=14, CL=35.5, Ag=108, Cu=64

Avogadro's number = $6.02\ x\ 10^{23}$ G.M.V at STPO = 22.4 dm^3

1 Faraday = 96500 Coulombs Standard pressure = 760 mmHg

Standard temperature = 273 K 1 litre = $1dm^3 = 1000\ cm^3$

SECTION A (16 MARKS)
Answer all questions in this section

1. For each item (i) – (x), choose the correct answer from the given alternatives and write the letter besides the item number in the answer sheet:

(i) The solution with pH of 5 is said to be;

A. A Strong base
B. A neutral
C. A weak acid
D. A strong acid
E. A weak base

(ii) Insoluble salts like Barium sulphate, generally can be obtained in the laboratory by: -

A. Evaporation of its concentrated solution
B. Crystallization
C. Precipitation
D. Decomposition
E. Displacement

(iii) In an experiment, 1930 coulombs liberated 0.64g of copper when the same quantity of electricity was passed through a solution of silver nitrate. What amount of Silver was deposited?

A. 32.00g
B. 2.16g
C. 108.00g
D. 10.80g
E. 21.60g

(iv) A reaction needs 0.5 moles of magnesium ribbon. How much magnesium in grams is that?

A. 12g
B. 0.12g

C. 1.2g
D. 11.2g
E. 24g

(v) In blast furnace carbon monoxide is prepared by passing carbon dioxide over a red-hot coke. What is a chemical role of carbon dioxide?
A. An accelerator
B. An oxidizing agent
C. A reducing agent
D. A catalyst
E. A flammable

(vi) Ethanol reacts with ethanoic acids to form a group of organic compounds named;
A. Alkynes
B. Halo alkanes
C. Esters
D. Alkenes
E. Alkanes

(vii) A form one student dissolved one mole salts **M** into water and the solution was tested by litmus paper. The salt was found to change blue litmus paper red. This salt is likely to be;
A. Normal
B. Complex
C. Basic
D. Acidic
E. Neutral

(viii) If Fatma wants to electroplate a spoon with copper by using Copper (ii) sulphate solution. She should arrange the electrodes as;
A. Spoon as anode and copper as cathode
B. Spoon as cathode and copper as anode
C. Spoon as anode and carbon as cathode
D. Spoon as cathode and copper sulphate solution as anode
E. Spoon as both anode and cathode

(ix) Diamond is used for cutting glass because
A. It does not conduct electricity
B. It cannot be spoiled by glass
C. It does not react with glass
D. It is very hard
E. It is used as ornament

(x) The reason why white anhydrous Copper (ii) sulphate turns blue when exposed in atmosphere is that, it_____.
A. Absorbs moisture
B. Reacts with Oxygen
C. Reacts with Oxygen
D. Reacts with Carbon dioxide
E. Releases water to the atmosphere

2. Match the items in LIST A with the responses in LIST B by writing the letter of the correct response beside the item number in the answer booklet provided.

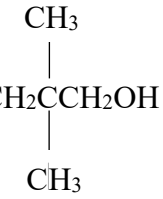
LIST A	LIST B
I. Electrode	A. Takes place at the anode
II. Electrolyte	B. Takes place at the cathode
III. Cation	C. Positive Electrode
IV. Anion	D. Positively charged ion
V. Reduction	E. Negative Electrode
VI. Oxidation	F. Negatively charged ion
	G. Conducts electricity by using free ions in solution or molten state
	H. Allows electric current to enter or leave the electrolyte

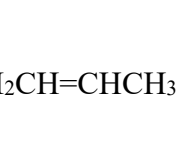
SECTION B (54 Marks)

Attempt all questions in this section

3. (a) Briefly explain the following observation about a sample of hard water;
   (i) When boils, it forms white precipitate
   (ii) After boiling, water form a scum
   (b) An organic compound P consists of 52.2% of carbon, 13% of Hydrogen and 34.8% of Oxygen. The vapour density of P is 23. Calculate the molecular formula of the compound.
   (c) Calculate the oxidation number of nitrogen in Potassium nitrate.

4. (a) Form four students from Kigoma secondary school went for tour studies at Refinery industry, the technician of the industry did not explain the terms below clearly. You as a form four student give clarification about these terms.
   (i) Cracking
   (ii) Homologous series
   (iii) Functional group
   (iv) Esterification
   (b) Giving two (2) reasons explain why carbon is found in all organic compounds
   (c) Name the following compounds according to IUPAC system

(i) 

(ii) 

(iii) 

5. 5.3g of L_2CO_3 was dissolved in water to make 0.5 litre of a solution. 25cm^3 of this solution required 50cm^3 of 0.1M HCl for complete reaction.
   (a) Write the balanced chemical equation for the neutralization reaction
   (b) Calculate the concentration of L_2CO_3 in $moldm^{-3}$
   (c) What is the relative molecular mass of L_2CO_3
   (d) Give the name of element L
6. A student accidentally spills concentrated sulfuric acid on their hand while performing an experiment.
   a) What should the student do immediately to prevent injury?
   b) Explain why it is dangerous to add water directly to concentrated sulfuric acid when diluting it.
   c) Give two reasons why we should not use chemicals from a chemical container with no label
7. The Haber Process is used to manufacture ammonia (NH_3) using the reaction:
   $N_{2(g)} + 3H_{2(g)} \text{----------} > 2NH_{3(g)}$ $\Delta H = -Xkj/mol$

Questions:

a) How does pressure affect the yield of ammonia? Explain.

b) Why is iron catalyst used in this process? Give two reasons

c) How temperature would be varied in order to produce more ammonia gas?

8. (a) Preventing rusting, you should prevent contact of water and air with iron and steel. Also to avoid using materials made from iron or steel. State the method that can be used to prevent rusting on each of the following;

   (i) Iron sheet

   (ii) Bridge and pipelines

   (iii) Camera

   (iv) Machine parts

   (b) Explain how would you use temperature and pressure to minimize the yield of sulphur trioxide in contact process based on Le-Chaterlie principle.

SECTION C (30 Marks)

Answer only two (2) question

9. **(a)** A sample of water forms scum with soap. When the water was boiled and then cooled it still formed scum. Suggest four methods that can be used to soften the water sample

   (b). Explain the following:

   (i) Sodium chloride becomes damp when left in air.

   (ii) Graphite is a non-metal yet it conducts heat and electricity.

   (iii) Many cooking pans are made of aluminum although it is a reactive metal.

10. Tanzania has coal at Kiwira in Mbeya Region. Authorities in the government have allowed using coal for domestic and industrial purpose. What warning can you raise about the probable effects of the excessive use of coal as an alternative form of energy? Give five (5) reasons.

11. (a) One of the methods used for preparation of oxygen is by decomposition of hydrogen peroxide

    (i) write the balanced equation for the reaction

    (ii) what is the purpose of MnO_2 in the reaction?

    (iii) What will happen to the rate of reaction if the the MnO_2 will not be used

    (iv) Name the method that is used to collect the gas

    (v) Why is gas collected by the named method above

    (b) Calculate the volume of oxygen at STP which could be obtained by decomposing 13.6g of hydrogen peroxide

    (c) Non metal and their compounds contribute lots of industrial and domestic. Identify elements, compound, or allotropes with respect to their roles of effect in the following

    (i) Cutting of glasses

    (ii) Manufacture of fertilizer

    (iii) Water treatment

    (iv) Manufacture of lubricants