SECTION A (40 Marks)

*Compulsory: Attempt **all** questions.*

Question 1

(a) Directions: ***For each question, there are four alternatives A, B, C and D. Choose the correct alternative and circle it. Do not circle more than ONE alternative. If there are more than one circled, NO score will be awarded.*** **[15]**

(i) Periodicity in the properties of elements is due to the same number of

A protons.
B neutrons.
C electrons.
D valence electrons.

(ii) Lithium, sodium, potassium and rubidium belong to the family of

A halogens.
B alkali metals.
C transition metals.
D alkaline earth metals.

(iii) A salt formed by the complete replacement of hydrogen in an acid is

A a basic salt.
B a mixed salt.
C an acidic salt.
D a normal salt.

(iv) What is the colour of the precipitate formed when NaOH is added to $FeSO_4$ solution?

A light blue
B dirty green
C chalky white
D reddish green

(v) An aqueous solution of an electro-valent compound is a good conductor of electricity because it

A has high boiling point.
B contains free electrons.
C contains free mobile ions.
D undergoes fast ionic reaction.

(vi) A compound with an empirical formula CH has a molecular mass 78. The molecular formula of the compound will be

A CH_4.
B C_2H_2.
C C_2H_6.
D C_6H_6.

(vii) Which one of the following compound has a molecular weight of 84 amu?

A $NaHCO_3$
B Na_2CO_3
C NaOH
D NaCl

(viii) The volume occupied by 6.4g of sulphur dioxide at STP is equal to

A 224 L.
B 22.4 L.
C 2.24 L.
D 0.224 L.

(ix) The process of oxidation is when a molecule

A gains electrons.
B gains hydrogen.
C loses electrons.
D loses oxygen.

(x) In the electrolysis of molten lead bromide, lead dissociates as

A atoms.
B anions.
C cations.
D molecules.

(xi) Bleaching action of sulphur dioxide is due to its

A reducing property.

B oxidizing property.

C hydrating property.

D dehydration property.

(xii) The drying agent used in the laboratory preparation of hydrogen chloride gas is

A CaO.

B P_2O_5.

C $CaCl_2$.

D conc. H_2SO_4.

(xiii) 'A colourless gas which is neutral in the dry state but becomes alkaline when dissolved in water'. The gas is

A CO_2.

B NH_3.

C SO_2.

D SO_3.

(xiv) Which one of the following compounds will undergo substitution reaction?

A C_2H_6

B C_2H_4

C C_2H_2

D C_3H_4

(xv) A reagent used to distinguish between ethane and ethene is

A chlorine.

B bromine.

C ammoniacal silver nitrate.

D ammoniacal cuprous chloride.

(b) Fill in the blanks with appropriate words. **[5]**

(i) In the electrolysis of water, hydrogen gas is released at the ……

(ii) A bond formed between two atoms by sharing a pair of electrons is called ……..

(iii) An acid changes methyl orange to …….. colour.

(iv) The light blue precipitate formed when NaOH is added to $CuSO_4$ solution is …… .

(v) …… gas is produced on treatment of metal sulphites and bisulphites with dilute acids.

(c) Match each item under Column A with the most appropriate item in Column B. Rewrite the correct matching pairs in the spaces provided below. **[5]**

Column A	**Column B**
(i) Molecular mass	a) gangue
(ii) Avogadro's number	b) valence electrons
(iii) Molar volume	c) slag
(iv) Valency	d) 6.023×10^{23}
(v) Earthy impurities	e) 22.4 L
(vi) $Mg(OH)_2$	f) 6.023×10^{21}
	g) iron
	h) 2 × vapour density

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(d) Rewrite the following statements by changing only the underlined words. **[5]**

(i) A weak attractive force known as <u>hydrogen bond</u> exists between non polar molecules.

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(ii) Only metals and <u>oxygen</u> are liberated at the cathode during electrolysis.

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(iii) <u>Conc. H_2SO_4</u> produces dense white fumes with ammonia.

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(iv) <u>Deliquescent</u> salts lose their water of crystallization and become powdery amorphous substance.

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(v) ZnO can be reduced to Zn by <u>carbon monoxide</u> .

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(e) State true or false against each statement. Correct and rewrite the false statements. **[6]**

(i) On moving down a group, the numbers of shells remain the same.

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(ii) Cu^{2+} is discharged at the cathode in preference to Na^{+} during electrolysis.

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(iii) Nitric oxide is produced in the catalytic oxidation of ammonia.

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(iv) The general formula of alkenes is C_nH_{2n+2}.

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(f) Explain the following: **[4]**

(i) The relative atomic mass of sulphur is 32.

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(ii) Gay Lussac's law of combining volume is not applicable to solids and liquids.

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(iii) In the manufacture of ammonia by Haber's process, the temperature in the catalyst chamber should not exceed 500°C.

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(iv) Green vitriol on treatment with conc. H_2SO_4 becomes white.

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SECTION B (40 Marks)
Attempt any four questions

Question 2.

(a) Study the list of the symbols of elements given below and answer the following questions: ${}^{19}_{9}A$, ${}^{39}_{19}B$, ${}^{31}_{18}C$, ${}^{35}_{17}D$, ${}^{40}_{20}E$, ${}^{32}_{16}F$ **[4]**

Which element

(i) belongs to group II A?

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(ii) has the largest atomic size?

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(iii) is a noble gas?

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(iv) has highest electron affinity?

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(b) The formula for a compound formed when calcium reacts with oxygen is CaO. Support this statement with the help of an electron dot diagram. **[2]**

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(c) State ***one*** use of the following compounds: **[2]**

(i) Acetylene

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(ii) Methyl alcohol

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(d) List down ***two*** examples where an alkali is used to prevent the harmful effects of acids in our daily life. **[2]**

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Question 3.

(a) Calculate the percentage composition of K_2MnO_4. **[2]**

(b) Answer the questions given below with reference to electrolysis of alumina.

(i) Mention ***one*** function of cryolite. **[1]**

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(ii) Why is the carbon anode replaced periodically? **[2]**

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(iii) Write down the reaction at the cathode. **[1]**

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(c) Explain the following statements: **[4]**

(i) 28g of nitrogen and 32g of oxygen have the same volume at STP.

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(ii) In an experiment with HCl gas, the colour of fountain appears red.

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(iii) Graphite is preferred to other electrodes for electrolysis.

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(iv) Cations get discharged at cathode during electrolysis.

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Question 4.

(a) Which reagent is used to distinguish between $AlCl_3$ and $ZnSO_4$? Explain. **[2]**

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(b) In a laboratory, a chemist mixes $50cm^3$ of hydrogen gas with $100cm^3$ of chlorine in presence of diffused light. Hydrogen gas reacts vigorously with chlorine giving white fumes of hydrogen chloride gas.

(i) Calculate the volume of chlorine which will react with $50cm^3$ of hydrogen. **[1]**

(ii) What will be the volume of the resulting gases? **[1]**

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(c) Despite the many environmental problems created by chemical industries, the use of various chemical products are a part of our lives. Do you think our government should ban the construction of chemical industries? Support your answer with ***three*** reasons. **[3]**

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(d) Answer the following questions with reference to the electrolysis of sodium chloride solution using graphite electrode.

(i) What substances are discharged at the cathode and anode respectively? **[2]**

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(ii) Sodium chloride solution becomes progressively more alkaline during electrolysis. Explain. **[1]**

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Question 5.

(a) Many metals are more useful to us when mixed with some other elements. Discuss this statement with respect to stainless steel. **[2]**

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(b) List down ***two*** main factors influencing the metallic character of elements. **[1]**

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(c) Atoms of element X and Y have 6 and 17 electrons respectively. Draw the electron dot diagram of the compound formed. **[2]**

(d) Give reasons for the following: **[5]**

(i) Atomic number of an atom does not change when it becomes an ion.

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(ii) In the manufacture of H_2SO_4 by the Contact process, SO_3 formed is not directly dissolved in water.

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(iii) Gold and silver often occur in the free state in nature.

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(iv) Acetylene undergoes addition reaction.

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(v) Silica crucible is used for the electrolysis of $PbBr_2$.

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Question 6.

(a) A student carried out an analysis of oxalic acid and found out the following compositions: H=2.2%, C=26.7% and O=71.1%.

(i) Determine the empirical formula of the compound. **[2]**

(ii) Calculate the molecular formula of oxalic acid if its molecular weight is 90. **[2]**

(b) Name the following: **[4]**

(i) a nitrate that produces nitrous oxide (laughing gas) on heating

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(ii) substances in their aqueous or molten state conduct electrical current

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(iii) electrically charged atoms

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(iv) catalyst used in the catalytic oxidation of ammonia

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(c) Distinguish between the following pairs based on what is given in the bracket. **[2]**

(i) Mg atom and Mg ion (*no. of shells*)

Mg atom	Mg ion

(ii) Methanol and ethanol (*structure*)

Methanol	Ethanol

Question 7.

(a) Complete and balance the following chemical equations: **[4]**

(i) $2HNO_3 + Ca(HCO_3)_2 \rightarrow Ca(NO_3)_2 + \ldots\ldots\ldots\ldots..$

(ii) $H_2SO_4 + \ldots\ldots\ldots\ldots.. \rightarrow Na_2SO_4 + 2H_2O$

(iii) $C_2H_4 + H_2O \xrightarrow[300°C, 60\,atm]{H_3PO_4} \ldots\ldots\ldots\ldots..$

(iv) $2CH_4 + \ldots\ldots\ldots \xrightarrow[200°C]{Cu} 2CH_3OH$

(b) Copper (II) nitrate on heating decomposes as given in the following equation: **[2]**

$2Cu(NO_3)_2 \xrightarrow{heat} 2CuO + 4NO_2 + O_2$

Calculate the mass of CuO obtained by heating 58.9g of $Cu(NO_3)_2$.

(c) Explain the mechanism of bleaching by sulphur dioxide. **[2]**

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(d) Sulphur dioxide bleaches coloured matter temporarily. **[2]**

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Atomic weights of elements

Elements	**Atomic weights**	**Elements**	**Atomic weights**
Hydrogen	**1**	Phosphorus	**31**
Helium	**4**	Sulphur	**32**
Lithium	**7**	Chlorine	**35.5**
Berylium	**9**	Potassium	**39**
Carbon	**12**	Calcium	**40**
Nitrogen	**14**	Manganese	**55**
Oxygen	**16**	Iron	**56**
Sodium	**23**	Copper	**63.5**
Magnesium	**24**	Zinc	**65**
Aluminium	**27**	Bromine	**80**
Silicon	**28**	Lead	**207**

for Rough Work

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