Roll No. | | | | | | |　　Answer Sheet No.__________

Sig. of Candidate.__________　　Sig. of Invigilator.__________

CHEMISTRY HSSC–II

SECTION – A (Marks 17)

Time allowed: 25 Minutes

NOTE:- **Section–A is compulsory and comprises pages 1–2. All parts of this section are to be answered on the question paper itself. It should be completed in the first 25 minutes and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. Do not use lead pencil.**

Q. 1 Insert the correct option i.e. A / B / C / D in the empty box provided opposite each part. Each part carries one mark.

(i) Which naturally occurring substance is mainly SiO_2?

A. Haematitie　　B. Lime stone
C. Cryolite　　D. Quartz

(ii) The following acids have been arranged in the order of decreasing acid strength. Identify the correct order:

I	II	II
$HOCl$	$HOBr$	HOI

A. $III > II > I$　　B. $I > III > II$
C. $I > II > III$　　D. $II > I > III$

(iii) Pyrolusite is mineral of:

A. Copper　　B. Chromium
C. Iron　　D. Manganese

(iv) Which one of the following equations represents the reaction that occurs when $Mg(NO_3)_2$ is heated strongly?

A. $Mg(NO_3)_2 \rightarrow Mg(NO_2)_2 + O_2$
B. $Mg(NO_3)_2 \rightarrow MgO + N_2O + 2O_2$
C. $2Mg(NO_3)_2 \rightarrow 2MgO + 4NO_2 + O_2$
D. $Mg(NO_3)_2 \rightarrow MgO_2 + 2NO_2$

(v) The brown gas formed, when metal reduces HNO_3 is:

A. NO_2　　B. NO
C. N_2O_3　　D. N_2O_5

(vi) Protonation of Ether yields an ion 'z':

$$C_2H_5-O-C_2H_5 + H^+ \rightarrow C_2H_5-\overset{\cdot\cdot\,+}{\underset{\underset{H_{(z)}}{|}}{O}}-C_2H_5$$

What is this ion called?

A. Protonium　　B. Oxonium
C. Carbonium　　D. Carbocation

(vii) Which compound reacts with its own oxidation product to give a sweet-smelling liquid?

A. Propanal　　B. 1 – Propanol
C. Propanoic acid　　D. Propane

(viii) Rectified spirit contains alcohol about:

A. 80%　　B. 90%
C. 95%　　D. 85%

(ix) The results of tests on compound 'z' are shown in the following table:

Test	Result
Addition of Bromine water	Turns colourless
Addition of aqueous Sodium Carbonate	CO_2 is formed

The compound 'z' is:

A. $CH_3-CH_2-CH_2-COOH$

B. $CH_3-CH_2-CH_2-OH$

C. $CH_2=CH-CH_2-OH$

D. $CH_2=CH-CH_2-COOH$

(x) Glucose and Fructose are:

A. Metamers B. Chain isomers

C. Functional isomers D. Position isomers

(xi) In which pair do both pollutants cause damage to buildings?

A. Nitrogen dioxide and Sulphur dioxide

B. Carbon monoxide and Lead compounds

C. Nitrogen dioxide and Lead compounds

D. Carbon monoxide and Lead compounds

(xii) Which process is used in chemical pulping for the production of paper pulps?

A. Kraft process

B. Sulphite process

C. Neutral sulphite semi-chemical process

D. All of these

(xiii) Oxidation of NO in air produces:

A. N_2O B. N_2O_4

C. N_2O_3 D. N_2O_5

(xiv) What are the geometries of the carbonyl carbon ($\overset{\diagup}{C}=O$) in acetaldehyde and then in the Acetal?

A. Trigonal Pyramid in acetaldehyde and Trigonal Pyramid in acetal

B. Trigonal planar in acetaldehyde and Tetrahedral in acetal

C. Trigonal Pyramid in acetaldehyde and Tetrahedral in acetal

D. Trigonal Planar in acetaldehyde and Trigonal Pyramid in acetal

(xv) Which one of the following molecules is a free radical?

A. N_2O B. OCl_2

C. BrO_3 D. H_2O_2

(xvi) The end product 'z' in the following sequence of reactions is:

$$CH_3COOH \xrightarrow{CaCO_3} X \xrightarrow{\Delta} Y \xrightarrow[H^+]{NH_2OH} Z$$

A. Acetaldehyde oxime B. Formaldehyde oxime

C. Methyl nitrate D. Propanoneoxime

(xvii) An organic compound 'Y' on treatment with acidified $K_2Cr_2O_7$ gives a compound 'Z' which reacts with I_2 and Sodium Carbonate to form idoform. The compound 'Y' is:

A. $CH_3CH(OH)CH_3$ B. CH_3CHO

C. CH_3COCH_3 D. CH_3OH

For Examiner's use only:

Total Marks: 17

Marks Obtained:

CHEMISTRY HSSC–II

Time allowed: 2:35 Hours **Total Marks Sections B and C: 68**

NOTE:- **Sections 'B' and 'C' comprise pages 1–3 and questions therein are to be answered on the separately provided answer book. Answer any fourteen parts from Section 'B' and attempt any two questions from Section 'C'. Use supplementary answer sheet i.e. Sheet–B if required. Write your answers neatly and legibly.**

SECTION – B (Marks 42)

Q. 2 Attempt any FOURTEEN parts. The answer to each part should not exceed 5 to 6 lines. (14 x 3 = 42)

(i) Hydration energies of the ions of Group IA of the periodic table are given as:

Ion	Hydration Energy
Li^+	$-499\ kj\ mol^{-1}$
Na^+	$-390\ kj\ mol^{-1}$
K^+	$-305\ kj\ mol^{-1}$

a. Define Hydration energy. 01

b. Why Hydration energy of K^+ is less than that of Na^+ ? 02

(ii) Solid Calcium carbonate is decomposed by heating:

a. Write an equation for the thermal decomposition of calcium carbonate. 01

b. Calcium carbonate decomposes at lower temperature than that of Barium carbonate. Explain it. 02

(iii) Both Silicon and Carbon are in group IV A of the periodic table.

a. What feature of their electronic structures is common to the atoms of Silicon and Carbon? 01

b. Why is SiO_2 a solid while CO_2 is a gas at room temperature? 02

(iv) A part of the periodic table is shown below. Using only these elements, answer the question below:

Be	*B*	*C*
Mg	*Al*	*Si*
		Ge
		Sn
		Pb

a. Write down the formula of a chloride which is electron deficient. 01

b. Write down the formula of an oxide which is amphoteric and give its reaction with a strong acid and a strong base separately. 02

(v) Cement is a very important building material.

a. Define cement. 01

b. What is a Slurry? 02

(vi) The carbon-carbon bond length in Benzene is different from that in Ethene.

a. Which compound contains the longer bond? 01

b. Give reason for your answer. 02

(vii) Some of the larger Hydrocarbons in crude oil are subject to the process of cracking.

a. Explain the term cracking by one example. 02

b. Why is cracking a commercially important process? 01

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(viii) There are different structural isomers of formula C_4H_9OH.

a. Draw the structures of the four Alcohols of formula C_4H_9OH. 02
b. Classify these isomers as primary, secondary or tertiary. 01

(ix) The compound 2–Bromo–2–methylbutane $(CH_3-CH_2-C(CH_3)_2Br)$, reacts with aqueous Potassium hydroxide solution to produce 2–Methyl–2–Butanol $(CH_3-CH_2-C(CH_3)_2OH)$

a. Give the mechanism. 02
b. Identify the rate determining step. 01

(x) Aromatic compounds undergo Electrophilic Substitution reactions.

a. Explain why Nitration of Toluene is easier than that of Benzene. 01
b. How would you convert Toluene into Trinitrotoluene (TNT). 02

(xi) Acetic acid is a component of vinegar.

a. How is Acetic acid manufactured from Acetylene? 02
b. What is glacial acetic acid? 01

(xii) Name the following compounds according to $IUPAC$ system.

a. $K_2[Pt\ Cl_6]$ 01
b. $(CH_3)_2C=CH_2$ 01
c. $HO-\underset{|}{CH}-COOH$ 01
$HO-CH-COOH$

(xiii) DNA carries the genetic code in living organisms and consists of a double helix.

a. How are the strands of the double helix held together? 01
b. How does DNA differ from RNA? 02

(xiv) The concentration of ozone in the stratosphere is being depleted through various chemical reactions worldwide.

a. What is meant by "ozone hole". 01
b. Write chemical equations for the reactions by which CFCs are removing O_3 in the stratosphere. 02

(xv) Standard electrode potential measures oxidizing power.

	F_2	Cl_2	Br_2	I_2
Standard reduction potential $E^o(v)$ $x_2+2e^- \rightarrow 2x^-$	+2.87	+1.36	+1.07	+0.54

a. Why the oxidizing power of F_2 is higher? 01
b. Upon which factors, does the oxidizing power of halogens depend? 02

(xvi) Nitrous acid behaves as an oxidizing as well as a reducing agent.

a. Write an equation for the reaction which confirms that it is reducing agent. 02
b. Define Reduction. 01

(xvii) Ethers contain $-\underset{|}{\overset{|}{C}}-O-\underset{|}{\overset{|}{C}}-$ functional group.

a. Describe preparation of Ethers by Williamsons Synthesis. 02
b. Why are Ethers slightly soluble in water? 01

(xviii) In Ethyne and other terminal alkynes, H–atom attached to the triply bonded carbon is slightly acidic.

a. Why 1–alkynes or Ethyne show acidic behaviour? 02
b. Write a reaction to show the acidic behaviour of Ethyne. 01

(xix) Pure clay is obtained by weathering of rocks. Explain the process of chemical weathering of rocks with one example. 03

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SECTION – C (Marks 26)

Note:- **Attempt any TWO questions. All questions carry equal marks.** **(2 x 13 = 26)**

Q. 3 Iron and Chromium are Transition elements.

a. (i) Write two properties of iron or its compounds that typify it as a transition element. 02

(ii) What is the difference between wrought iron and steel? 02

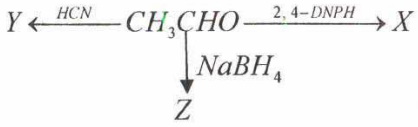
(iii) How is iron protected from rusting by the process of Galvanizing? 03

b. (i) Draw the structure of Dichromate $Cr_2O_7^{-2}$ ion. 02

(ii) What is chromyl chloride test? Write its equation for $NaCl$. 02

(iii) How is potassium dichromate prepared? 02

Q. 4 **a.** Consider the following series of reactions involving **Ethanal**, then answer the questions which follow:



(i) Draw the structural formula of the compound 'Y' and 'Z'. 02

(ii) Describe the appearance of the compound X. Give its name. Give outline of the mechanism for the reaction of Ethanal with $2, 4-DNPH$ to produce compound X. 05

(iii) Give a chemical test by which you could distinguish between Ethanal and Propanone. 02

b. Nylon-6, 6, the synthetic polymer is used to blend with wool (protein) in clothes.

(i) Name the functional group common to both Nylon-6, 6 and protein. 01

(ii) Draw repeat unit of Nylon-6, 6, from its monomers. 03

Q. 5 **a.** Chloroethene can be obtained from Ethene in the laboratory by the following route:

$$CH_2 = CH_2 \xrightarrow{I} ClCH_2 - CH_2Cl \xrightarrow{II} CH_2 = CHCl$$

(i) Describe the conditions necessary for each of the reactions I and II. 02

(ii) Describe the steps in the mechanism of reaction I. 03

(iii) Name the type of reaction I. 01

b. How would you convert Ethene into Formaldehyde? 03

c. Sulphuric acid is a dehydrating agent.

(i) Write chemical equation for the reaction when conc. sulphuric acid is added to oxialic acid. 02

(ii) Give a chemical test for one of the gases evolved, when conc. Sulphuric acid is added to oxalic acid. 02