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Answer Sheet No._____

Sign. of Candidate _____

Sign. of Invigilator _____

CHEMISTRY HSSC–II (2nd Set)

SECTION – A (Marks 17)

Time allowed: 25 Minutes

Section – A is compulsory. All parts of this section are to be answered on this page and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. **Do not use lead pencil.**

Q.1 Fill the relevant bubble for each part. Each part carries one mark.

(1) Propose which one of the following reactions is more likely to occur through S_N1 mechanism?

A. $(CH_3)_2CH-Cl \xrightarrow{CCl4/NaOH} CH_2)_2\ CH-OH$ ◯

B. $C_2H_5Cl \xrightarrow{NaOH/H_2O} C_2H_5-OH$ ◯

C. $(CH_3)_3\ CCl \xrightarrow[NaOH]{H_2O} (CH_3)_3C-OH$ ◯

D. $(CH_3)_3C-Cl \xrightarrow{CCl4/NaOH} (CH_3)_3COH$ ◯

(2) An aldehyde when strongly heated with Fehling's reagent gives red precipitate. What property of an aldehyde is observed in this reaction?

A. Reducing property. ◯ B. Oxidizing property. ◯

C. Neutralizing ability. ◯ D. Redox property. ◯

(3) Predict which one of the following compound is a monomer of an addition polymer.

A. C_2H_3Cl ◯ B. C_2H_6O ◯

C. C_6H_6 ◯ D. CH_2O ◯

(4) Identify which one of the following has the highest boiling point:

A. 1-Butanol ◯ B. 2-Butanol ◯

C. 2-Methyl-2- Propanol ◯ D. 1- Propanol ◯

(5) Identify the product Y in the following scheme:

$C_6H_6+CH_3Cl \xrightarrow{AlCl_3} X \xrightarrow{KMnO_4/H_2SO_4} Y$

A. Toluene ◯ B. Xylene ◯

C. Benzoic acid. ◯ D. Acetophenone ◯

(6) Predict the co-ordination number in $[Pt(OH)_2(NH_3)_4]SO_4$.

A. 4 ◯ B. -4 ◯

C. 6 ◯ D. 2 ◯

(7) Identify a mixture of two organic solvents that are used in nail polish remover.

A. Benzene and acetone ◯ C. Ethyl acetate and CS_2 ◯

B. Benzene and CS_2 ◯ D. Acetone and ethyl acetate ◯

(8) RNA contains four different nitrogenous bases **EXCEPT**.

A. Adenine ◯ B. Guanine ◯

C. Thymine ◯ D. Cytosine ◯

(9) When ozone is treated with alkene, aldehyde and ketone are produced, identify which one of the following will produce two moles of butanone.

A. 2 Butene ◯ B. 3,4-Dimethyl-3-hexene. ◯

C. 3-methyl-3-hexene ◯ D. 2 – Hexene. ◯

(10) Cyclopropane is an example of:

A. Acyclic compound ◯ B. Alicyclic compound ◯

C. Heterocyclic compound ◯ D. Aromatic compound ◯

(11) Identify an element with higher ionization energy:

A. Greater metallic character ◯ B. Larger atomic size ◯

C. Strong reducing agent ◯ D. Less electropositive ◯

(12) Quote the wave length range of IR region

A. 0.8-2.5µm ◯ C. 2.5-16µm ◯

B. 16-1000µm ◯ D. 400-800µm ◯

(13) Predict which one of the following metal hydroxide is least soluble in water?

A. $Sr(OH)_2$ ◯ B. $Mg(OH)_2$ ◯

C. $Ba(OH)_2$ ◯ D. $Ca(OH)_2$ ◯

(14) Name which one of the following gas is not pollutant?

A. Sulphur dioxide ◯ B. Carbon monoxide ◯

C. Carbon dioxide ◯ D. Nitrogen dioxide ◯

(15) Predict the color change when a base is added into potassium dichromate solution:

A. Yellow to blue ◯ B. Orange to yellow ◯

C. Yellow to orange ◯ D. Green to yellow ◯

(16) Identify carboxylic acid which is present in Vinegar:

A. citric acid ◯ B. ethanoic acid ◯

C. oxalic acid ◯ D. methanoic acid ◯

(17) Prioritize the highest acidity of carboxylic acid in the following:

A. Propanoic acid ◯

B. Ethanoic acid ◯

C. Chloro-ethanoic acid ◯

D. 2-Methyl Propanoic acid ◯

Federal Board HSSC-II Examination
Chemistry Model Question Paper
(Curriculum 2006)

Time allowed: 2:35 hours Total Marks: 68

Note: Answer any fourteen parts from Section 'B' and attempt any two questions from Section 'C' on the separately provided answer book. Write your answers neatly and legibly.

SECTION – B (Marks 42)

Q.2 Attempt any **FOURTEEN** parts from the following. All parts carry equal marks. $(14 \times 3 = 42)$

i. In group II A, Mg behaves differently against water at different conditions. Prove your answer giving valid chemical equations.

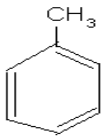
ii. How Fajan rule controls the covalent or ionic character of group IV A elements?

iii. $_{26}Fe^{56}$ and $_{30}Zn^{65}$ both belongs to 3d series of transition elements, but both show different magnetic behavior. Give reason.

iv. Describe the role of Chloro flouro Carbon (CFCs) in depleting ozone layer.

v. Why do we arrange compounds in homologous series? Tabulate the first five members of homologous series of alcohol.

vi. Benzene gives ortho, para and meta substitution products. Identify A and B by completing reactions.



$$+ [O] \xrightarrow{KMnO_4 / H_2SO_4} A + H_2O$$

$$A + HNO_3 \xrightarrow[H_2SO_4/30^0C]{} B + H_2O$$

vii. Grignard's reagent is an organo-metallic compound. How Grignard's reagent is used to prepare 2- methyl pentanoic acid? Give valid chemical reaction.

viii. Show functional group isomers of $C_5H_{10}O$.

ix. Haloform reaction is used to distinguish the different organic compounds. Distinguish $CH_3\text{-}CH_2\text{-}CH_2\text{-}OH$ and $CH_3\text{-}\underset{\displaystyle OH}{\underset{|}{CH}}\text{-}CH_3$ by chemical reaction.

x. Carboxylic acid reacts with alcohol to form organic compound having fruity smell called ester. Show reaction mechanism of esterification.

xi. Ethanol is used as a fuel. It is a polar compound. Illustrate the manufacturing of ethanol from the aldehyde with the help of chemical reaction with essential conditions.

xii. How will you distinguish between pentanal and 3-pentanone by chemical reactions.

xiii. Partial hydrogenation of 2-Butyne gives two geometrical isomers. Justify the statement with the help of valid chemical equations with conditions.

xiv. Name different routes for the loss of mineral zinc from human body.

xv. Lipids possess different physical and chemical properties. Differentiate between fats and oils, with the structural formula.

xvi. Demonstrate the structural product when CH_3–CH_2–CHO reacts with NaOH. Also given the name of the reaction.

xvii. The 0.5439g of organic compound consist of C, H and O was subjected to combustion analysis and yield 1.03g CO_2, 0.636g H_2O. Determine its molecular formula when molar mass of organic compound is 138g/mole.

xviii. Two compounds X and Y having carbonyl functional group (C=O) along with four carbons. When X and Y are treated with ammonical silver nitrate solution silver mirror is formed with X while Y does not give silver mirror. Identify X compound by reaction and give IUPAC name of the X and Y compounds.

xix. Polymers consist of monomers joined by either addition or condensation reactions. Discuss synthetic condensation polymer with reaction.

xx. Carboxylic acid can be converted into primary alcohol by following sequence of reactions

$CH_3CH_2CO_2H \xrightarrow{\text{Step I}} A \xrightarrow{\text{Step 2}} CH_3CH_2CO_2H$

Predict the reagent for step 1 and 2. Also identify A by its IUPAC name.

SECTION – C (Marks 26)

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

Q.3 a. Halogens show different oxidizing trend down the group. How they react with concentrated H_2SO_4? Support your answer by giving suitable chemical reaction. (2+2+2)

b. Transition metals have ability to form complex compounds. Describe the components of complex compounds. (2+2+3)

Q.4 a. Consider the reaction

$$(CH_3)_3C\text{-}Cl \xrightarrow{\text{Aqueous/NaOH}} x$$

Demonstrate the reaction mechanism of the reaction. Also explain reaction mechanism. (3+4)

b. Acetic acid is a weak acid. It is present in vinegar. Illustrate the preparation of three derivatives from acetic by chemical reactions. (2+2+2)

Q.5 a. Identify A and B compounds by completing the chemical reactions. Also write IUPAC names of A and B. (2+2+1.5+1.5)

$$CH_3CH_2\overset{\overset{O}{\|}}{C}CH_3 + HCN \xrightarrow{NaCN/HCl} A$$

$$A + HCl + H_2O \longrightarrow B + NH_4Cl$$

b. Dye is a colored compound capable of being fixed to a fabric. Discuss any three classifications of dyes based on chromophores with examples. (2+2+2)

CHEMISTRY HSSC-II (2nd Set)
Student Learning Outcomes Alignment Chart

SECTION A

Q.1

(1) Describe the mechanism and types of nucleophilic substitution reactions.
(2) Describe oxidation reactions of aldehydes and ketones.
(3) Describe the chemical processes of addition and condensation polymerization.
(4) Explain reactivity of alcohols.
(5) Discuss chemistry of benzene and Friedal craft's acylation.
(6) Explain shapes, origin of colors and nomenclature of coordination compounds.
(7) Describe preparation and application of various cosmetics like nail polish remover, lipstick and nail polish.
(8) Identify the structural components of DNA and RNA.
(9) Describe the chemistry of alkanes by the ozonolysis.
(10) Explain the shapes of alkanes and cycloalkanes exemplified by ethane and cyclopropane.
(11) Explain the trends and physical properties in group I, II, IV and VII of the periodic table.
(12) State the regions of electromagnetic spectrum used in IR spectroscopy.
(13) Discuss the trend in solubility of the hydroxides of Group II elements.
(14) Recognize that the release of CO_x, SO_x, NO_x and VOCs are associated with the combustion of hydrocarbons based fuels.
(15) Describe the reactions of potassium dichromate with oxalic acid and Mohr's salt.
(16) Identify carboxylic acids in the laboratory.
(17) Discuss reactivity of carboxylic acids.

SECTION – B

Q2.

i. Describe reactions of group II elements with water.
ii. Explain the trends in oxidation states in group IV.
iii. Describe the electronic structure of elements and ions of d-block elements.
iv. Describe the role of CFC's in destroying ozone in the stratosphere.
v. Classify organic compounds on structural basis.
vi. Apply the knowledge of position of substituents in the electrophilic substitution of benzene.
vii. Discuss the preparation and chemistry of Grignard's reagent by the addition of carbon dioxide.
viii. Define and explain the term isomerism with suitable examples.
ix. Compare aldehydes and ketones, describe their reactivity.
x. Describe the chemistry of carboxylic acids by conversion to carboxylic acid derivatives.
xi. Describe the preparation of alcohols by reduction of aldehydes.
xii. Describe the reactivity of aldehydes and ketones and their comparison.
xiii. Discuss chemistry of alkynes by hydrogenation.
xiv. Describe the role of Zn in nutrition.
xv. Describe the basis of classification and structure, function relationship of lipids.
xvi. Discuss chemistry of Grignard's reagent by the addition of ketone.
xvii. Discuss the procedure of combustion analysis.
xviii. Describe oxidation reactions of aldehydes and ketones.
xix. Describe the chemical processes of addition and condensation polymerization.
xx. Describe the reactions of carboxylic acid derivatives.

SECTION – C

Q.3 a. Explain the relative behavior of halogens as oxidizing and reducing agents.
b. Explain shapes, origin of colour and nomenclature of coordination compounds.

Q.4 a. Describe the mechanism of nucleophilic substitution reactions.
b. Describe the chemistry of carboxylic acids by conversion to carboxylic acid derivatives.

Q.5 a. Describe acid and base catalyzed nucleophilic addition reactions of aldehydes and ketones.
b. Discuss types and applications of dyes.

CHEMISTRY HSSC-II (2nd Set)

TABLE OF SPECIFICATION

Topics/Subtopics	**s and p block elements 13**	**d and f block elements 14**	**Organic compounds 15**	**Hydro carbons 16**	**Alkyl halides and amines 17**	**Alcohol phenyl and ether 18**	**Aldehyde and ketones 19**	**Carboxylic acids 20**	**Bio chemistry 21**	**Industrial chemistry 22**	**Environmental chemistry 23**	**Analytical chemistry 24**	**Total marks for each Assessment Objective**	**%age of cognitive level**
(Knowledge based)		1xv(01) 3b(07)	1x(01) 2v(03)				1ii(01)	4b(06)	1viii(01) 2xiv(03)	1vii(01) 5b(07)	1xiv(01) 2iv(03)	1xii(01)	36	31%
(Understanding based)	1xi(01) 1xiii(01) 2i(03) 2ii(03) 3a(06)	1vi(01)		1ix(01) 2vi(03) 2xiii(03)	1i(01) 2vii(03) 2xvi(03) 4a(07)	1iv(01)	2xii(03) 2xviii(03)	1xvi(01) 2x(03) 2xx(03)	2xv(03)	2xix(03)	1iii(01)		57	49.1%
(Application based)		2iii(03)		1v(01) 2viii(03)		2ix(03)	2xi(03) 5a(06)	1xvii(01)				2xvii(03)	23	19.8%
Total marks for each Topic/Subtopic	14	12	4	11	14	4	16	14	7	11	5	4	116	100%

KEY:

1(1)1

Question No (Part No.) Allocated Marks

Note: (i) The policy of FBISE for knowledge based questions, understanding based questions and application based questions is approximately as follows:

a) **30% knowledge based.**
b) **50% understanding based.**
c) **20% application based.**

(ii) The total marks specified for each unit/content in the table of specification is only related to this model question paper.

(iii) The level of difficulty of the paper is approximately as follows:

a) **40% easy**
b) **40% moderate**
c) **20% difficult**