23

Version No.			
4	0	9	1

ROLL NUMBER					

CHEMISTRY
HSSC-II
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.

حصہ اوّل لازمی ہے۔ اس کے جوابات اسی صفحہ پر دے کر نظم مرکز کے حوالے کریں۔ کاٹ کر دوبارہ لکھنے کی اجازت نہیں ہے۔ لیڈ پنسل کا استعمال ممنوع ہے۔

Answer Sheet No. _____

ہر سوال کے سامنے دیے گئے، کریکولم کے مطابق درست دائرہ کو پر کریں۔ **Invigilator Sign.** _____

Fill the relevant bubble against each question according to curriculum: **Candidate Sign.** _____

	Question	A	B	C	D	A	B	C	D
1.	Which of the following has **highest** ionization energy?	Lithium	Boron	Oxygen	Nitrogen	○	○	○	○
2.	Which of the following oxides is **acidic**?	Na_2O	KO_2	MgO	NO_2	○	○	○	○
3.	Pb^{+4} compounds are good:	Reducing agents	Oxidizing agents	Dehydrating agents	Hydrating agents	○	○	○	○
4.	Carboxylic acids can be prepared by the reactions of Grignard reagent with:	Oxygen	Nitrogen	Carbon dioxide	Formaldehyde	○	○	○	○
5.	To what category of molecules do enzymes belong?	Carbohydrates	Proteins	Lipids	Fats	○	○	○	○
6.	Peroxyacetyl Nitrate (PAN) is an irritant to human beings and it affects:	Eyes	Nose	Stomach	Skin	○	○	○	○
7.	Chemically nail polish remover is:	Acetone	Acetic acid	Ethanol	Ether	○	○	○	○
8.	Which of the following electronic transitions requires highest amount of energy when a compound is interacted with ultraviolet radiations?	$n \rightarrow \dot{\pi}$	$\pi \rightarrow \dot{\pi}$	$\delta \rightarrow \dot{\delta}$	$n \rightarrow \dot{\delta}$	○	○	○	○
9.	Height of peak in mass spectrum shows:	Number of isotopes	Mass number	Relative abundance of isotopes	Number of protons	○	○	○	○
10.	Which of the following will **NOT** give iodoform test?	Formaldehyde	Acetaldehyde	Acetone	Ethanol	○	○	○	○
11.	Oxidation of 2-Propanol gives:	Acetaldehyde	Formaldehyde	Acetone	Acetic acid	○	○	○	○
12.	Nitration of phenol takes place at _____ than benzene.	Slower rate	Faster rate	Equal rate	Moderate rate	○	○	○	○
13.	Reaction of alcohols with sodium metal gives:	Helium gas	Hydrogen gas	Carbon dioxide	Carbon monoxide	○	○	○	○
14.	Geometrical isomerism is shown by:	Lactic acid	Acetic acid	1-Butene	2-Butene	○	○	○	○
15.	Which of the following alkynes is **acidic** in nature?	1-Butyne	2-Butyne	2-Pentyne	3-Hexyne	○	○	○	○
16.	Which type of functional group is present in compound $CH_3COOCOCH_3$?	Ester	Anhydride	Acid amide	Ether	○	○	○	○
17.	The oxidation state of central metal (Mn) in the following complex $Na[Mn(CO)_5(F)_2]$ is:	+2	+3	−1	+1	○	○	○	○

SUPPLEMENTARY TABLE

Atomic No	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Symbol	H	He	Li	Be	B	C	N	O	F	Ne	Na	Mg	Al	Si	P	S	Cl	Ar	K	Ca
Mass No	1	4	7	9	11	12	14	16	19	20	23	24	27	28	31	32	35.5	40	39	40

CHEMISTRY HSSC–II

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

NOTE: Answer any fourteen parts from Section 'B' and any two questions from Section 'C'. Write your answers neatly and legibly.

SECTION – B (Marks 42)

Q. 2 Attempt any FOURTEEN parts. All parts carry equal marks. **(14 x 3 = 42)**

(i) How can the following conversions be carried out?
a. Nitro benzene → Aniline **b.** Acetamide → Methyl amine

(ii) Differentiate between 'Ethanol', '2-Prpanol' and '2-Methyl 2-Propanol' on the basis of Lucas test.

(iii) Write mechanism of the reaction when two molecules of Formaldehyde react with each other in the presence of $NaOH$.

(iv) Write the preparation of Ethanol and 2-Propanol from Grignard reagent.

(v) How is Nylon $6,6$ prepared by condensation polymerization? Write its equations.

(vi) Enlist the raw materials used for the preparation of lipstick.

(vii) Briefly explain the trends in solubility of the hydroxides and sulphates of group II elements.

(viii) Write any three advantages of atomic emission spectroscopy.

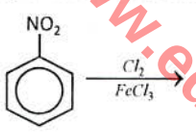
(ix) Identify any three types of electronic transitions in Formaldehyde $(H-CHO)$ when it is subjected to ultraviolet radiations

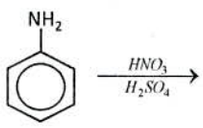
(x) How can Ethanol and Acetone be identified by IR spectrum?

(xi) Write chemical equations for the preparation of Acetone by hydration of a suitable alkyne.

(xii) Briefly describe two causes that explain the inert nature of alkanes towards polar reagents.

(xiii) Predict the major product in the following reactions

a. 

b. 

(xiv) What is homologous series? Write its two characteristics.

(xv) Write names of the following coordination compounds.
a. $Na_4[Mn(CN)_6]$ **b.** $Cr[(NO_2)_3(NH_3)_3]$ **c.** $[Ni(CO)_4(F)_2]SO_4$

(xvi) Why Zn^{+2} complexes are colorless? Explain briefly with the help of d-d transitions phenomenon.

(xvii) Why is ionization energy of nitrogen greater than that of oxygen? Although the ionization energy increases along the period.

(xviii) Write chemical reactions to show the amphoteric nature of Al_2O_3.

(xix) Why K_2CO_3 is more stable than Li_2CO_3? Support your answer in terms of the polarizing ability of positive ion.

(xx) Why is CCl_4 insoluble and $SiCl_4$ soluble in water? Explain your answer by writing mechanism for hydrolysis of group IV halides.

SECTION – C (Marks 26)

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

Q. 3 a. Write mechanisms for nitration and alkylation of Benzene.
b. What is Global warming? Write three adverse effects of each 'global warming' and 'acid rain' on environment.

Q. 4 a. What is esterification? Write mechanism for the acid catalyzed reaction between methanol and acetic acid.

b. Briefly explain the effect of: **i.** Temperature **ii.** pH and **iii.** Substrate concentration on enzyme activity along with general graphical representation for each factor.

Q. 5 a. Differentiate beryllium (Be) from other members of its group in terms of its behaviors of:
i. Nitrides **ii.** Carbides **iii.** Oxides **iv.** Reaction with alkalies **v.** Reaction with Hydrogen **vi.** Water of crystallization and its **vii.** Hardness.

b. Explain three differences using 'Kinetic evidence', 'Stereochemical evidence' and 'Structure of substrate' between SN_2 and SN_1 reactions.

SUPPLEMENTARY TABLE

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25

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Answer Sheet No. _____

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	Question	A	B	C	D	A	B	C	D
1.	Carboxylic acid reacts with metal to form salts with the evolution of:	CO_2	H_2	CO	CH_4	○	○	○	○
2.	Reaction of Triglycerides with alkalies is called:	Hydration	Saponification	Hardening	Dehydration	○	○	○	○
3.	Which of the following is **correct** formula of Ziegler catalyst?	$R_3Al + ZnCl_4$	$R_2Al + TiCl_4$	$R_3Al + TiCl_4$	$RAl + TiCl_4$	○	○	○	○
4.	Oxidizing smog consists of high concentration of:	O_3	SO_2	NO_2	Cl_2	○	○	○	○
5.	Which region of electromagnetic spectrum is involved in bonds vibrations?	Ultraviolet	Infra red	Radio waves	Microwaves	○	○	○	○
6.	The characteristic signal of Carbonyl Carbon of acetone in I.R spectrum will be detected at:	$3200cm^{-1}$	$1200cm^{-1}$	$800cm^{-1}$	$1720cm^{-1}$	○	○	○	○
7.	Which of the following aldehydes will be most reactive towards Nucleophiles?	Benzaldehyde	Acetaldehyde	Formaldehyde	Propanalde-hyde	○	○	○	○
8.	Which of the following has highest ionization energy?	Al	Si	P	S	○	○	○	○
9.	Which of the following alcohols will produce least stable alkoxide ion when $O-H$ bond breaks?	Methanol	Ethanol	2-Propanol	2-Methyl 2-Propanol	○	○	○	○
10.	2,3-dimethyl-2-butene on reaction with O_3/H_2O yields two molecules of:	Acetaldehyde	Acetone	Formaldehyde	Benzaldehyde	○	○	○	○
11.	Which of the following alcohols **cannot** be synthesized when Grignard reagent reacts with aldehydes and ketones?	Ethanol	Isobutyl alcohol	Propanol	Methanol	○	○	○	○
12.	No. of chiral centres in lactic acid $COOH(CH)OH$ with CH_3 are:	Two	One	Three	Four	○	○	○	○
13.	The general formula of cycloalkanes resembles with.	Alkenes	Alkynes	Alkanes	Benzene	○	○	○	○
14.	The only alkaline earth metal which releases H_2 gas when reacted with alkalies is:	Be	Mg	Ca	Sr	○	○	○	○
15.	Which of the following is **most Paramagnetic?**	Fe^{3+}	Sc^{3+}	Ti^{4+}	V^{+5}	○	○	○	○
16.	Coordination sphere in $[Cu(en)_3]SO_4$ is:	Neutral	Positively charged	Negatively Charged	Amphoteric	○	○	○	○
17.	Which of the following hydroxides of group II elements is least soluble in water?	$Ca(OH)_2$	$Mg(OH)_2$	$Be(OH)_2$	$Sr(OH)_2$	○	○	○	○

SUPPLEMENTARY TABLE

—2HA-I 2309 HA—

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CHEMISTRY HSSC–II

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NOTE: Answer any fourteen parts from Section 'B' and any two questions from Section 'C'. Write your answers neatly and legibly.

SECTION – B (Marks 42)

Q. 2 Attempt any FOURTEEN parts. All parts carry equal marks. (14 x 3 = 42)

(i) Why group II carbonates are thermally unstable as compared to group I carbonates?

(ii) Why salts of Be^{+2} ion cannot have more than four molecules of water of crystallization?

(iii) Write chemical reactions to show the amphoteric nature of BeO.

(iv) Why CO_2 is gas while SiO_2 is solid at room temperature? Draw structural diagrams of CO_2 and SiO_2

(v) Describe with justification of the anomalous trends in the ionization potential of 3rd period elements.

(vi) Write IUPAC names of following coordination compounds.

a. $(NH_4)_2[Pt(Cl)_6]$ **b.** $[CO(F)_6(Br)_2]SO_4$ **c.** $[Ni(CO)_5]$

(vii) How V_2O_5 acts as a catalyst in contact process in the given reaction? $SO_2 + \frac{1}{2}O_2 \xrightarrow{V_2O_5} SO_3$

(viii) What is meant by **a.** *Partial Synthesis* **b.** *Total Synthesis* of organic compounds in lab?

(ix) Why Pb^{+4} compounds are less stable and act as an oxidizing agent? Explain with help of inert pair effect.

(x) Why bond enthalpy of $F-F$ is less than $Cl-Cl$? Although size of Chlorine is bigger than that of Fluorine.

(xi) Differentiate between metamerism and tautomerism with a suitable example of each.

(xii) Which two factors determine the reactivity of alkyl halides? Write correct order of reactivity.

(xiii) Write product and mechanism for the following reaction. $CH_2 = CH_2 + Br_2 \rightarrow ?$

(xiv) Differentiate between 1-butyne and 2-butyne by ozonolysis.

(xv) Which of the following is more acidic? Give reason. **a.** 2-Methyl Phenol **b.** 2-Nitro Phenol

(xvi) How can Ethanol and Methanol be differentiated by iodoform test? Write chemical equation for the test.

(xvii) Briefly explain any three sources by which raw materials are obtained for chemical industries.

(xviii) What is spectroscopy? Write its principle.

(xix) Write three applications of atomic absorption spectroscopy.

(xx) Differentiate between qualitative and quantitative analysis with suitable example of each.

SECTION – C (Marks 26)

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

Q. 3 a. What are carbohydrates? Briefly describe

i. Monosaccharides, **ii.** Disaccharides and **iii.** Polysaccharides with suitable examples.

b. Write mechanism for the formation of an ester by a reaction between ethanol and acetic acid catalyzed by an acid.

Q. 4 a. What is sulphonation? Write mechanism for sulphonation of Benzene.

b. Write reactions and predict the products when Methyl Magnesium Bromide (CH_3MgBr) reacts with:

(i) CO_2 **(ii)** $CH_3-CH_2-\overset{\overset{O}{\|}}{C}-CH_3$ **(ii)** $H-\overset{\overset{O}{\|}}{C}-H$

Q. 5 a. What is acid rain? How it occurs? Write its four adverse effects on environment.

b. Justify the given order of acidity with reason. *Carboxylic Acid* > *Phenol* > *Alcohol*

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