



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

Version No.				
4	0	0	5	3

ROLL NUMBER						

0	●	●	0	0
1	1	1	1	1
2	2	2	2	2
3	3	3	3	●
●	4	4	4	4
5	5	5	●	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9

0	0	0	0	0	0	0
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3	3	3	3	3	3	3
4	4	4	4	4	4	4
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6	6	6	6	6	6	6
7	7	7	7	7	7	7
8	8	8	8	8	8	8
9	9	9	9	9	9	9

Answer Sheet No. _____

Invigilator Sign. _____

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

Question	A	B	C	D	A	B	C	D
1. Empirical formula of an organic compound is $C_5H_8O_5$ and its molecular mass is 372g/mol. Molecular formula of this compound is:	$C_{12}H_{32}O_{20}$	$C_{15}H_{24}O_{25}$	$C_9H_{24}O_{15}$	$C_6H_{16}O_{10}$	☐	☐	☐	☐
2. The number of signals in ^1H-NMR spectrum of Acetone will be:	3	4	1	2	☐	☐	☐	☐
3. Which of the following has lowest density?	Rh	Li	Na	K	☐	☐	☐	☐
4. Which statement is correct?	Na is smaller than P atom	Cl is smaller than Cl^-	Cl^- is smaller than Cl atom	Na^+ is bigger than Na atom	☐	☐	☐	☐
5. Among sulphates of Group-II elements, _____ has the lowest solubility in water.	$SrSO_4$	$BeSO_4$	$MgSO_4$	$CaSO_4$	☐	☐	☐	☐
6. The expected shape of $[Fe(H_2O)_6]^{+2}$ based on its coordination number is:	Tetrahedral	Octahedral	Linear	Square planar	☐	☐	☐	☐
7. Chemical break down of organic compounds by microorganisms e.g., bacteria is called:	Fermentation	Respiration	Metabolism	Transpiration	☐	☐	☐	☐
8. Heterolytic cleavage of covalent bond converts bonded atoms into:	Only Anions	Both cations and anions	Free radicals	Only cations	☐	☐	☐	☐
9. Which of the following alkyl halides will yield alkenes more easily?	2-Chloro Propane	2-Methyl-2-Bromo Propane	Chloro Methane	Bromo Ethane	☐	☐	☐	☐
10. Which of the following is a bad leaving group?	Br^-	I^-	F^-	Cl^-	☐	☐	☐	☐
11. Which alcohol is NOT the direct product of reaction when Grignard reagent reacts with aldehydes or ketones?	Propanol	2-Methyl-2-Propanol	Ethanol	Methanol	☐	☐	☐	☐
12. Which alcohol will yield an oily layer on heating, according to Lucas test?	2-Methyl 2-Propanol	3-Hexanol	2-Butanol	Ethanol	☐	☐	☐	☐
13. Which will be least reactive towards nucleophilic addition reactions?	Acetone	Propanal	Formaldehyde	Acetaldehyde	☐	☐	☐	☐
14. What are the expected products when Butanone is oxidized?	2 molecules of Butanoic acid	2 molecules of acetic acid	Formic acid, Acetic acid	2 molecules of Formic acid	☐	☐	☐	☐
15. Succinic acid resembles with substrate and inhibits the enzyme activity by attaching on its active site. It is an example of:	Allosteric inhibition	Partial inhibition	Competitive inhibition	Non-competitive inhibition	☐	☐	☐	☐
16. A fire fighter's helmet made of plastic becomes hard after a fire. Helmet is made of:	Elasto plastic	Fiber plastic	Fire plastic	Thermo setting plastic	☐	☐	☐	☐
17. Ozone is being mainly destroyed by:	CFC's	PAN	SO_2	CO_2	☐	☐	☐	☐

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

SECTION – B (Marks 42)

Q. 2 Answer the following parts briefly.

(14x3=42)

(i)	Justify the given statements. a. Al is considered as best conductor in 3 rd period elements. b. Size of " Na^+ " is smaller than " Na ".	03	OR	How Fe^{+2} act as a catalyst in given reaction? Write its two steps mechanism. $S_2O_8^{2-} + 2I^- \xrightarrow{Fe} 2SO_4^{2-} + I_2$	1x3
(ii)	Write two chemical reactions to show the acidic nature of SO_3 .	03	OR	Why group II-B and III-B are considered as non-typical transition elements?	03
(iii)	Complete and balance the given chemical equations. a. $NaOH + Cl_2O \longrightarrow$ b. $PCl_3 + H_2O \longrightarrow$ c. $Na_2O_2 + H_2O \longrightarrow$	03	OR	Identify the type of synthesis (Partial or total) for each of the following: a. Conversion of Ethanol into Ethanal. b. Synthesis of vegetable Ghee from oil.	03
(iv)	Beryllium (Be) differs from other alkaline earth metals in terms of its reactions with hydrogen and alkalis. Describe these differences and provide the relevant chemical equations.	03	OR	Write chemical reactions of $KMnO_4$ in acidic medium with: a. $FeSO_4$ b. Mohr's Salt (Balancing is not necessary)	03
(v)	Sodium and Magnesium belong to same period but why is Sodium Carbonate more stable than Magnesium Carbonate?	03	OR	Identify the type of isomerism in given pairs. a. 1-Chloro propane and 2-Chloro propane b. Butanone and Butanal c. Diethyl Ether and Methyl Propyl Ether	03
(vi)	Briefly explain the 'Coal' and 'Petroleum' as the source of organic compounds.	03	OR	Briefly explain simple, conjugated and derived proteins with one example in each case.	03
(vii)	Briefly describe any three types of adhesives.	03	OR	Describe two sources of oxides of Nitrogen and Sulphur with one environmental impact associated with each of these pollutants.	03
(viii)	Differentiate between qualitative and quantitative analysis with suitable example in each.	03	OR	Differentiate between addition and condensation polymers with suitable example in each.	03
(ix)	How can ethanol and acetone be differentiated using I.R spectroscopy specifically through characteristic signals?	03	OR	Provide the chemical equation to illustrate how ozonolysis of same alkyne can be used to prepare two molecules of acetic acid.	03
(x)	Write major products in the given reactions: a.  $\xrightarrow[FeCl_3]{CH_3-Cl}$? b.  $\xrightarrow{2H_2SO_4}$?	03	OR	Explain why the basic strength of amines follows the order Secondary amine > Primary amine > Tertiary amine	03
(xi)	Arrange the following alcohols in order of increasing reactivity towards the cleavage of O-H bond: Ethanol, 2-Methyl-2-Propanol and 2-Propanol.	03	OR	Which is stronger acid between Di-Flouro ethanoic acid or Tri-Flouro ethanoic acid? Given reason.	03
(xii)	Write any three differences between E_2 and E_1 reactions of alkyl halides.	03	OR	What are the alternatives to ChloroFlouro carbons (CFCs)? How do they compare in terms of environmental impact and effectiveness?	03
(xiii)	Write the mechanism of the given reaction: $2CH_3OH \xrightarrow[140^\circ C]{Conc. H_2SO_4} CH_3OCH_3 + H_2O$	03	OR	Briefly describe why ethanol exhibits three signals in its NMR spectrum, whereas acetone shows only one signal.	03
(xiv)	Complete the given chemical equations. a. $CH_3COCl + CH_3COOH \xrightarrow{H^+}$ b. $CH_3COOC_2H_5 + LiAlH_4 \longrightarrow$ c. $CH_3MgBr + CH_3CN \longrightarrow$	03	OR	Write two chemical equations to show the amphoteric nature of BeO .	03

SECTION – C (Marks 26)

Note: Attempt the following questions.

Q.3	What is Grignard's reagent? Outline the step by step synthesis of Propanoic Acid, 2-Propanol and Ethane using suitable Grignard reagent.	1+2 + 2+2	OR	What is mass spectrometry? Explain its working and its applications in determining the relative atomic mass.	1+4 +2
Q.4	Provide the chemical reactions for the hydrolysis of Group-IV tetrahalides. Explain why carbon tetrahalides are not hydrolysed and describe the trend in ease of hydrolysis of tetrahalides down the group.	4+ 1+1	OR	Explain the mechanism of Nitration and Friedel craft Acylation of Benzene highlighting key steps and intermediates.	3+3
Q.5	Write chemical equations to illustrate the basic nature of Group-I normal oxides, per-oxides and super oxides using Na_2O , Na_2O_2 and NaO_2 as examples.	2x3	OR	Provide the chemical equations for the Nucleophilic addition reactions between. a. Acetone and Phenyl Hydrazine b. Acetaldehyde and 2,4- Dinitrophenyl Hydrazine c. Formaldehyde and Hydrazine	2x3
Q.6	By providing resonance structures of their conjugate bases, explain why the order of acidic strength is: $RCOOH > Phenol > Alcohol$	07	OR	Describe the effects of pH, Temperature and Substrate Concentration on enzyme activity. (Include a general graphical representation illustrating the optimum conditions for enzyme activity)	2+2 +3

SUPPLEMENTARY TABLE

— 2HA-I 25005 (B) —

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



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HSSC-II
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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.

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لکھنے کی اجازت نہیں ہے۔ لید پینسل کا استعمال نہ کریں۔

Version No.				
4	2	0	5	3

ROLL NUMBER						

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6	6	6	6	6	6	6
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Answer Sheet No. _____

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 Nuclei will be magnetically active in NMR spectroscopy?	$^{16}_8\text{O}$	$^{19}_9\text{F}$	$^{14}_7\text{N}$	$^{12}_6\text{C}$	☐	☐	☐	☐
2. The presence of specific functional groups in a molecule is commonly identified by:	NMR spectroscopy	Mass spectroscopy	UV visible spectroscopy	IR spectroscopy	☐	☐	☐	☐
3. Which of the 3 rd period elements has the highest melting point?	Al	Si	Na	Mg	☐	☐	☐	☐
4. Which of the following statement is correct regarding the density of Group-I elements?	Density of "K" is lower than "Na"	Density of "Li" is higher than "K"	Density of "Na" is lower than "Li"	Density of "K" is higher than "Na"	☐	☐	☐	☐
5. Which sulphate of Group-II elements has the highest solubility in water?	BeSO_4	SrSO_4	MgSO_4	CaSO_4	☐	☐	☐	☐
6. Coordination number in $[\text{Cu}(\text{NH}_3)_2(\text{NH}_2)_2]\text{SO}_4$ is:	3	1	2	4	☐	☐	☐	☐
7. Identify the organic compound:	NH_4CNO	NH_2CONH_2	CO_2	CO	☐	☐	☐	☐
8. Homolytic cleavage of covalent bond converts the bonded atoms into:	Free radicals	Both cations and anions	Only Anions	Only cations	☐	☐	☐	☐
9. Which alcohol will yield alkenes more easily among the given options?	2-Methyl-2-Propanol	2-Butanol	1-Propanol	2-Propanol	☐	☐	☐	☐
10. Which of the following alkyl halides is most likely to undergo an $\text{S}_\text{N}2$ reaction?	2-Methyl-2-Chloro Propane	3-Chloro Pentane	1-Chloro Propane	2-Chloro Propane	☐	☐	☐	☐
11. Which alcohol is NOT the direct product of reaction when Grignard reagent reacts with aldehydes or ketones?	Propanol	2-Methyl-2-Propanol	Ethanol	Methanol	☐	☐	☐	☐
12. Which alcohol will yield immediately oily layer according to Lucas test?	3-Pentanol	2-Methyl 2-Propanol	2-Butanol	Ethanol	☐	☐	☐	☐
13. Which of the following will be more reactive towards nucleophilic addition reactions?	Methanal	2-Methyl Pentanal	Acetone	Ethanal	☐	☐	☐	☐
14. Carboxylic acids are reduced to which product on reaction with LiAlH_4 ?	Tertiary alcohols	Esters	Primary alcohols	Secondary alcohols	☐	☐	☐	☐
15. Succinic acid resembles with substrate and inhibits the enzyme activity by attaching on its active site. It is an example of:	Allosteric inhibition	Partial inhibition	Competitive inhibition	Non-competitive inhibition	☐	☐	☐	☐
16. Which type of hair dye penetrates the hair shaft and provides long lasting colors but can damage the hair as well?	Temporary hair dye	Permanent hair dye	Semi-permanent hair dye	Demi permanent hair dye	☐	☐	☐	☐
17. Ozone is being mainly destroyed by:	CFC's	PAN	SO_2	CO_2	☐	☐	☐	☐

—2HA-I 25005 (D)—

SUPPLEMENTARY TABLE

Page 1 of 1

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

SECTION – B (Marks 42)

Q. 2 Answer the following parts briefly.

(14x3=42)

(i)	Justify the given statements: a. 2 nd electron affinity is endothermic. b. Electron affinity of chlorine is higher than fluorine.	03	OR	Why Group-II-B and III-B elements are called Non-typical transition elements?	03
(ii)	Write two chemical reactions to explain the acidic nature of SO_2 .	03	OR	Write chemical reactions of $K_2Cr_2O_7$ in acidic medium with: a. Oxalic acid b. Mohr's salt (Balancing is not necessary)	03
(iii)	Complete and balance the given chemical equations: a. $Cl_2O_7 + H_2O \longrightarrow$ b. $NaOH + Cl_2O_7 \longrightarrow$ c. $SiCl_4 + H_2O \longrightarrow$	03	OR	Identify the major products in the given reactions. a. $CH_3COOCOCH_3 + NH_3 \longrightarrow$ b. $CH_3COOC_2H_5 + LiAlH_4 \longrightarrow$ c. $CH_3 - C \equiv N \xrightarrow[Hent]{H_2O}$	03
(iv)	How is Beryllium Carbide (Be_2C) different from carbides of other alkaline earth metals? Justify your answer by furnishing chemical reactions.	03	OR	How can Fe^{+3} ions be detected in an aqueous solution? Also write the relevant chemical equation.	03
(v)	Na_2CO_3 is thermally more stable than $MgCO_3$. Discuss the underlying reasons for this difference in stability.	03	OR	Provide the chemical equation to illustrate how can ozonolysis of same alkyne be used to prepare formic acid and acetic acid.	03
(vi)	What is destructive distillation of Coal? Write any two products obtained by destructive distillation of coal.	03	OR	Write any three important fractions along with their specific use obtained by fractional distillation of petroleum.	03
(vii)	How is DNA different from RNA in terms of ribose sugar, nitrogen bases and functions?	03	OR	Write any three differences between SN_2 and SN_1 reactions of alkyl halides.	03
(viii)	Identify the type of synthesis (Total or partial) for each of the following: a. Oxidation of Toluene to form Benzoic acid. b. Synthesis of Urea from NH_3 and CO_2	03	OR	Identify the more stable alkene in each of the given pairs and explain reason for stability. a. 1,3-pentadiene and 1, 4-pentadiene b. 2, 3 Dimethyl -2-butene and 2-methyl -2-butene	03
(ix)	Write major products in the given reactions: a.  $\xrightarrow[95^\circ C]{HNO_3 + H_2SO_4}$? b.  $\xrightarrow[FeCl_3]{CH_3Cl}$?	03	OR	Identify the stronger acid from phenol and 2-Nitro phenol and explain the reason behind the increased acidic strength.	03
(x)	Arrange the following alcohols in order of increasing reactivity towards cleavage of C-O bond; Ethanol, 2-Propanol and 2-Methyl-2-Propanol.	03	OR	Identify the stronger base between ammonia and methyl amine and justify the reason behind the increased basic strength.	03
(xi)	Write mechanism of the given reaction: $2CH_3CH_2OH \xrightarrow[140^\circ C]{conc. H_2SO_4} CH_3CH_2OCH_2CH_3 + H_2O$	03	OR	Write chemical equations to show the amphoteric nature of $Al(OH)_3$	03
(xii)	Briefly describe the "Atmosphere", "Lithosphere" and "Biosphere" as a source of raw materials for chemical industries.	03	OR	What is chemical shift? Why is tetramethyl silane (TMS) used as reference for calculating the chemical shift of other compounds in NMR spectroscopy?	03
(xiii)	A stream of water has the following BOD levels 5mg/L, 1mg/L and 3mg/L. Describe the condition of water (Clean, very clean etc) corresponding to each BOD level.	03	OR	What will be the effect of Infra-red, Ultra violet and Microwaves radiations on water molecules when they are subjected to these radiations?	03
(xiv)	Identify two sources each of Ozone and Nitrogen oxides (NO and NO_2) and describe one environmental effect of each pollutant.	03	OR	Identify any three types of electronic transitions that occur when acetone molecules are subjected to ultra violet radiations.	03

SECTION – C (Marks 26)

Note: Attempt the following questions.

Q.3	Arrange the halide ions in order of their reducing strength and explain the trend using chemical equations with sulphuric acid.	2+5	OR	Describe substitution reactions. Explain the mechanism of Nitration and Friedel Craft Alkylation of Benzene highlighted by key steps and intermediates.	1+3 +3
Q.4	Analyse the trends in 3 rd period elements with respect to: a. Ionization energy (How it varies across the period along with its anomalous behaviour) b. Electrical conductivity (What is the trend and the underlying reasons)	3+3	OR	Provide the chemical reaction for the preparation of diethyl ether using the following methods: a. Williamson synthesis b. Reaction of Alkyl halides with dry silver oxide (Ag_2O)	3+3
Q.5	Outline the step by step synthesis of Butanoic acid, 2-Methyl-2-Propanol and Methane using a suitable Grignard reagent.	2x3	OR	Provide the chemical equations for the Nucleophilic addition reactions between: a. Acetaldehyde and Hydrazine b. Acetone and Hydroxyl amine c. Formaldehyde and 2,4-Dinitrophenyl Hydrazine	2x3
Q.6	What are Lipids? Write the chemical equation for: a. Hydrolysis of Triglycerides b. Saponification of Triglycerides c. Hardening of oils (any oil)	1+2 + 2+2	OR	0.48g of an organic compound containing only "C", "H" and "Oxygen" burned completely forming 0.70 g CO_2 and 0.288g of H_2O . Molecular mass of compound is 120g/mol. Calculate the empirical and Molecular formula for this compound.	07

SUPPLEMENTARY TABLE

— 2HA-I 25005 (D) —

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