25

Version No.				
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ROLL NUMBER						

CHEMISTRY HSSC-I

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 ناظم 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.	The third ionization potential value of an element is **significantly high** as compared to its 1st and 2nd ionization potentials. The element belongs to:	Group–1 (I-A)	Group–2 (II-A)	Group–17 (VII-A)	Group–18 (VIII-A)	○	○	○	○
2.	Which pair of elements will most likely form an ionic bond?	*C & H*	*B & Cl*	*Na & O*	*H & Cl*	○	○	○	○
3.	Which statement is **FALSE** about **comparative bond energy values** of Hydrogen halide molecules?	*H–Cl > H–F*	*H–F > H–Cl*	*H–Cl > H–Br*	*H–Br > H–I*	○	○	○	○
4.	The number of molecules present in 67.2 dm^3 of ***He*** gas at STP is:	6.02×10^{24}	1.204×10^{24}	1.806×10^{24}	2.4×10^{24}	○	○	○	○
5.	What will be the enthalpy of solution of *NaCl* if ΔH (reverse lattice) is *+786 kj/mol* and ΔH (hyd) is *-783 kj/mol*?	*+3 kj/mol*	*–3 kj/mol*	*+1569 kj/mol*	*–1569 kj/mol*	○	○	○	○
6.	The following equilibrium will **NOT** be shifted in the forward direction by: $(N_2 + 3H_2 \rightleftharpoons 2NH_3 + \Delta)$	Increasing temperature	Increasing pressure	Adding H_2 gas	Removing NH_3	○	○	○	○
7.	Aqueous solution of which of the following salts will have pH less than 7?	Na_2SO_4	KNO_3	$CuSO_4$	Na_2CO_3	○	○	○	○
8.	Position of an element in periodic table with electronic configuration $1s^2$, $2s^2p^6$, $3s^2p^2$ is:	In Group–1 (I-A)	In Group–2 (II-A)	In Group–13 (III-A)	In Group–14 (IV-A)	○	○	○	○
9.	Peroxyacetyl nitrate (PAN) is formed by the reaction of oxides of nitrogen with:	Oxides of sulphur	Hydrogen sulphide	Oxides of phosphorus	Unburned hydrocarbons	○	○	○	○
10.	Which of the following halides can reduce H_2SO_4 to H_2S?	*NaF*	*NaCl*	*NaBr*	*NaI*	○	○	○	○
11.	Identify the step in the mechanism of free radical chlorination of ethane: $CH_3-CH_3 + Cl^{\bullet} \longrightarrow CH_3-CH_2^{\bullet} + HCl$	Initiation	Propagation	Substitution	Termination	○	○	○	○
12.	Identify the product formed when Ethyl Bromide is warmed with ***NaOH*** in ethanol:	$CH_2=CH_2$	CH_3-CH_2-ONa	CH_3-CHO	$CH_2=CH$-Br	○	○	○	○
13.	Which reagent is used for the reduction of Carboxylic acids to Alcohols?	$KMnO_4$	$K_2Cr_2O_7$	$LiAlH_4$	H_2/Pt	○	○	○	○
14.	The compound which gives Silver mirror test as well as Iodoform test is:	Ethanol	Ethanal	Propanal	Propanone	○	○	○	○
15.	Which pair of organic compounds can be distinguished by using 2, 4–DNPH?	Ethanol and Acetone	1–Propanol and 2–Propanol	Ethanal and Ethanol	Ethyl chloride and Ethyl bromide	○	○	○	○
16.	Identify correct relationship for determination of half-life of a first order reaction:	$t_{1/2} = 0.693/k$	$t_{1/2} = [A^\circ]/2k$	$t_{1/2} = 1/k[A^\circ]$	$t_{1/2} = 0.0231[A^\circ]/k$	○	○	○	○
17.	Which of the following organic compound can be identified by Fehling solution test?	CH_3-CH_2-OH	CH_3-$COOH$	CH_3CH_2CHO	CH_3-CH_2-Cl	○	○	○	○

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–I

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

SECTION – B (Marks 42)

Q. 2 Answers the following parts briefly. **(14 x 3 = 42)**

(i)	Write down electronic configuration of : $_{29}Cu^{+2}$, $_{33}As$, $_{35}Br^{-1}$	03	OR	What is meant by Catenation? What is its importance in organic chemistry?	1+2
(ii)	Briefly explain the structure of PCl_3 & NH_4^+ ion on the basis of VSEPR theory.	1.5 + 1.5	OR	Write down the chemical tests with equations to identify chlorides, bromides and iodides present in aqueous solution.	03
(iii)	Keeping in view the factors affecting bond energy, Justify the order of bond energies in the following: **a)** $Cl_2 > F_2$ **b)** $H_2 > HBr$ **c)** $N_2 > O_2$	03	OR	Describe any three properties of water which are due to hydrogen bonding.	03
(iv)	Write down three differences between limiting and non–limiting reactants.	03	OR	Write down the reaction of Ethyl Bromide with $KOH_{(aq)}$, NH_3 and $AgNO_3$.	03
(v)	State any three differences between crystalline and non– crystalline solids.	03	OR	Briefly describe the terms 'shell', 'sub–shell' and 'orbital'.	03
(vi)	Why Enthalpy of solution for NH_4NO_3 is +25.7 kj/mol (endothermic process) whereas that of $CaCl_2$ is -83.0 kj/mol (exothermic process)? Explain briefly.	1.5 + 1.5	OR	What is acid rain? Describe its formation with the help of chemical reactions involved.	1+2
(vii)	Write down any three measures that ensure the preservation of water resources.	03	OR	How can iodoform test be applied to the alcohols? Describe by giving chemical equations.	1.5 + 1.5
(viii)	Why aqueous solution of Na_2CO_3 is basic whereas that of NH_4Cl is acidic? Justify by giving chemical equations.	1.5 + 1.5	OR	How can Ethyl amine be prepared from: **a)** An Alkyl halide **b)** A Nitrate **c)** An Amide	03
(ix)	Determine the principal energy level and number of valence electrons in the different sub-shells and orbitals of an element present in 3rd period and group-VI A of the periodic table.	03	OR	Write down the mechanism of base catalysed nucleophilic addition reaction of formaldehyde $(HCHO)$ with HCN .	03
(x)	Describe the use of compounds of sulphur in any three chemical industries.	03	OR	State Markonikoff's rule by giving an example and its mechanism.	1x3
(xi)	Calculate the volume occupied by $3.011x10^{24}$ molecules of NH_3 gas enclosed in a container at STP.	03	OR	How is Ethanol prepared from an/a: **a)** Alkene **b)** Alkyl halide **c)** Carboxylic acid	03
(xii)	Briefly describe β – elimination reaction by giving a suitable example.	03	OR	Write down the reactions of 1– Propanol with: **a)** $SOCl_2$ **b)** PCl_5 **c)** Conc. $H_2SO_4/180°$	03
(xiii)	Calculate K_c for the following reaction at equilibrium at 100°C. $2SO_{2(g)} + O_{2(g)} \rightleftharpoons 2SO_{3(g)}$ $[SO_2]$=0.59 M $[O_2]$ =0.05 M $[SO_3]$=0.259 M	03	OR	Calculate total entropy change when $NaCl$ dissolves in water under standard conditions: $NaCl_{(s)} \longrightarrow Na^+_{(aq)} + Cl^-_{(aq)}$ $S°(NaCl)=72.1\ j/mol/K$, $S°(Na^+)=321\ j/mol/K$ $S°(Cl^-)=56.5\ j/mol/K$	03
(xiv)	Draw Born-Haber cycle for the formation of KCl. (Calculation is **NOT** required)	03	OR	For the reaction $N_2O_4 \longrightarrow 2NO_2$, the concentration of N_2O_4 is reduced from 0.1M to 0.05M in 60 sec. If reaction is 1st order, calculate rate constant for this reaction.	03

SECTION – C (Marks 26)

Attempt the following questions.

Q.3	What is mass spectrometry? Explain the construction and working of a mass spectrometer. How can average atomic mass of an element be calculated from data obtained?	1+4 +2	OR	Explain formation of covalent bonds in O_2 molecule on the basis of molecular orbital theory and valance bond theory. Justify that molecular orbital theory is superior to valence bond theory.	3+3 +1
Q.4	Describe by giving balanced chemical equations and necessary conditions that how a Carboxylic acid can be prepared from: **a)** CH_3-CH_2-Cl **b)** $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2-OH$ **c)** C_6H_5-CHO	2x3	OR	Discuss the effect of following changes on the given reactions at equilibrium: i. Increasing pressure: $C_3H_8 + 5O_2 \rightleftharpoons 3CO_2 + 4H_2O$; ii. Removing SO_3: $2SO_2 + O_2 \rightleftharpoons 2SO_3$; iii. Decreasing temperature: $CO_2 + \Delta \rightleftharpoons CO + \frac{1}{2}O_2$	2x3
Q.5	How can one identify the functional groups in the following compounds by chemical tests? Elaborate. **a)** CH_3CHO **b)** CH_3-CH_2-OH **c)** $CH_3-CH=CH_2$	2x3	OR	Why is Ethene more reactive than Ethane? Write down the reactions of Ethene with: **a)** H_2SO_4/H_2O **b)** Cl_2/H_2O	2+2 +2
Q.6	What is solubility product? Derive an expression for the solubility product of CaF_2. How can the concept of solubility product be applied to predict the precipitation of CaF_2 on mixing aqueous solutions of Ca^{+2} and F^{-1} ions?	1+2 +4	OR	Explain the occurrence of a chemical reaction with reference to molecular collisions, activation energy, formation of activated complex and enthalpy changes in the reaction.	07

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