Q.# / Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	Level 7 (Marks)
2 (i)	Calculation of the volume of oxygen produced by the decomposition of 3.04×10^{24} formula unit of $KClO_3$ $2KClO_3 \rightarrow 2KCl + 3O_2$	Writing correct calculation of the volume of oxygen produced by the decomposition of 3.04×10^{24} formula unit of $KClO_3$ $2KClO_3 \rightarrow 2KCl + 3O_2$ (3)	Partially Correct calculation (2)	Any relevant information (1)	Wrong answer (0)			
OR								
2 (i)	Calculation of the wave number of hydrogen (H_α)in Balmer series of hydrogen spectrum	Writing correct calculation of the wave number of hydrogen (H_α)in Balmer series of hydrogen spectrum (1.5)	Partially Correct calculation (1)	Any relevant information(0.5)	Wrong answer (0)			
	Calculation of the wave number of hydrogen (H_α) in second line in Paschen series of hydrogen spectrum	Writing correct calculation of the wave number of hydrogen (H_α) in second line in Paschen series of hydrogen spectrum (1.5)	Partially Correct calculation (1)	Any relevant information(0.5)	Wrong answer (0)			
2 (ii)	Calculation of the percentage yield when 40g of H_2 produces 100g of NH_3 $N_2 + 3H_2 \rightarrow 2NH_3$	Writing correct calculation of the percentage yield when 40g of H_2 produces 100g of NH_3 $N_2 + 3H_2 \rightarrow 2NH_3$ (3)	Partially Correct calculation (2)	Any relevant information(1)	Wrong answer (0)			
OR								
2 (ii)	Justification of the statement with reference to azimuthal	Writing correct Justification of the statement with reference to azimuthal	Partially Correct description (1)	Any relevant information(0.5)	Wrong answer (0)			

Q.# / Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	Level 7 (Marks)
	quantum number s- Orbital has maximum two electrons.	quantum number s-orbital has maximum two electrons (1.5)						
	Justification of the statement with reference to azimuthal quantum number p- Orbital can accommodate maximum six electrons.	Writing correct Justification of the statement with reference to azimuthal quantum number p- orbital can accommodate maximum six electrons (1.5)	Partially Correct description (1)	Any relevant information(0.5)	Wrong answer (0)			
2 (iii)	Calculation of the number of molecules of SO_2 gas if its volume is 500cm^3 at S.T.P	Writing correct calculation of the number of molecules of SO_2 gas if its volume is 500cm^3 at S.T.P (3)	Partially Correct calculation (2)	Any relevant information (1)	Wrong answer (0)			
OR								
2 (iii)	Reason/ description of CO_2 is linear while H_2O is bent or V shaped	Writing correct Reason/ description of CO_2 is linear while H_2O is bent or V shaped (3)	Partially Correct Reason (2)	Any relevant information (1)	Wrong answer (0)			

Q.# / Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	Level 7 (Marks)
2 (iv)	Calculation of the number of molecules of CO_2 when 4.8×10^{24} molecules of CH_4 reacts with excess of water. $CH_4 + 2H_2O \rightarrow CO_2 + 4H_2$	Writing correct calculation of the number of molecules of CO_2 when 4.8×10^{24} molecules of CH_4 reacts with excess of water. $CH_4 + 2H_2O \rightarrow CO_2 + 4H_2$ (3)	Partially Correct calculation (2)	Any relevant information(1)	Wrong answer (0)			
OR								
2 (iv)	Draw the shape on the basis of VSEPR theory **i. SO_2**	Drawing correct shape of SO_2 on the basis of VSEPR theory (1)	Partially Correctly response (0.5)	Wrong answer (0)				
	Draw the shape on the basis of VSEPR theory **ii.H_2S**	Drawing correct shape of H_2S on the basis of VSEPR theory (1)	Partially Correctly response (0.5)	Wrong answer (0)				
	Draw the shape on the basis of VSEPR theory **iii.CBr_4**	Drawing correct shape of CBr_4 on the basis of VSEPR theory (1)	Partially Correctly response (0.5)	Wrong answer (0)				
2 (v)	Description of **i. Line spectrum**	Writing correct description of Line spectrum (1)	Partially Correct description of Line spectrum (0.5)	Wrong answer (0)				
	Description of **ii. Stark effect**	Writing correct description of stark effect (1)	Partially Correct description of stark effect (0.5)	Wrong answer (0)				
	Description of **iii. Continuous spectrum**	Writing correct description of continuous spectrum (1)	Partially Correct description of continuous spectrum	Wrong answer (0)				

Q.# / Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	Level 7 (Marks)
			(0.5)					
OR								
2 (v)	1st Distinction between sigma and Pi bond	Writing 1st correct distinction between sigma and Pi bond (1)	Partially Correctly response (0.5)	Wrong answer (0)				
	2nd Distinction between sigma and Pi bond	Writing 2nd correct distinction between sigma and Pi bond (1)	Partially Correctly response (0.5)	Wrong answer (0)				
	3rd Distinction between sigma and Pi bond	Writing 3rd correct distinction between sigma and Pi bond (1)	Partially Correctly response (0.5)	Wrong answer (0)				
2 (vi)	Calculation of the average molar mass of the air at sea level at $0^{o}C$,if density of air is $1.29kg/m^3$	Writing correct calculation of the average molar mass of the air at sea level at $0^{o}C$,if density of air is $1.29kg/m^3$ (3)	Partially Correct calculation (2)	Any relevant information(1)	Wrong answer (0)			
OR								
2 (vi)	Justification of i. Petrol evaporates earlier than water	Writing correct justification of Petrol evaporates earlier than water (1.5)	Writing partially correct justification (1)	Any relevant information (0.5)	Wrong answer (0)			
	Justification of ii. Water has low vapour pressure than ethyl alcohol	Writing correct justification Water has low vapour pressure than ethyl alcohol (1.5)	Writing partially correct justification (1)	Any relevant information (0.5)	Wrong answer (0)			
2 (vii)	Effect on the volume of the gas if i. Its pressure is	Writing correct effect on volume if its pressure is halved and its kelvin	Partially correct response (1)	Any relevant information (0.5)	Wrong answer (0)			

Q.# / Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	Level 7 (Marks)
	halved and its kelvin temperature is doubled	temperature is doubled (1.5)						
	Effect on the volume of the gas if **ii.** Its pressure is doubled and its kelvin temperature is doubled	Writing correct effect on volume if its pressure is doubled and its kelvin temperature is doubled (1.5)	Partially correct response (1)	Any relevant information (0.5)	Wrong answer (0)			
OR								
2 (vii)	Reason/ description of heat of vaporization (ΔH_v) is always greater than heat of fusion (ΔH_f)	Writing correct Reason/ description of heat of vaporization (ΔH_v) is always greater than heat of fusion (ΔH_f) (3)	Writing partially correct description(2)	Any relevant information (1)	Wrong answer (0)			
	Calculation of numerical value of general gas constant R for one mole of a gas at STP **i.** SI unit	Writing correct calculation of numerical value of general gas constant R for one mole of a gas at STP **i.** SI unit (1.5)	Partially Correct calculation (1)	Any relevant information(0.5)	Wrong answer (0)			
2 (viii)	Calculation of numerical value of general gas constant R for one mole of a gas at STP **ii.** Pressure in atm volume in dm^3	Writing correct calculation of numerical value of general gas constant R for one mole of a gas at STP ii) Pressure in atm volume in dm^3 (1.5)	Partially Correct calculation (1)	Any relevant information(0.5)	Wrong answer (0)			

Q.# / Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	Level 7 (Marks)
OR								
2(viii)	Any 1st characteristic of plasma	Writing any 1st Correct characteristics of plasma(1)	Partially correct response (0.5)	Wrong answer (0)				
	Any 2nd characteristic of plasma	Writing any 2nd Correct characteristic of plasma(1)	Partially correct response (0.5)	Wrong answer (0)				
	Any 3rd characteristic of plasma	Writing any 3rd Correct characteristic of plasma(1)	Partially correct response (0.5)	Wrong answer (0)				
2 (ix)	Prediction of the shape of ZnS by using formula of radius ratio if radius of Zn^{+2} is 74pm and radius of S^{-2} is 184pm	Writing correct prediction of the shape of ZnS by using formula of radius ratio if radius of Zn^{+2} is 74pm and radius of S^{-2} is 184pm (3)	Partially correct response (2)	Writing Any relevant information(1)	Wrong answer (0)			
OR								
2 (ix)	Derivation of the expression $\left(K_c = \dfrac{4x^2}{v(a-x)} \right)$ For a reaction $N_2O_4 \rightleftharpoons 2NO_2$	Writing correct derivation in justified steps (3)	Writing partially correct derivation in justified steps (2)	Writing Any relevant information(1)	Wrong answer (0)			
2 (x)	Calculation of the value of K_p at 1050^0C if K_c is 2.3×10^{22} for the reaction $2CO(g)+O_{2(g)} \rightleftharpoons 2CO_{2(g)}$	Writing correct calculation of k_p (3)	Partially Correct calculation (2)	Any relevant information(1)	Wrong answer (0)			
OR								
2 (x)	K_{sp} expression of i. $Ca_3(PO_4)_2$	Writing correct K_{sp} expression (1.5)	Writing partially correct K_{sp} expression (1)	Any relevant information(0.5)	Wrong answer (0)			

Q.# / Part #	Criteria	Level 1 (Marks)	Level 2 (Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	Level 7 (Marks)
	K_{sp} expression of **ii.** Na_2SO_4	Writing correct K_{sp} expression (1.5)	Writing partially correct K_{sp} expression (1)	Any relevant information(0.5)	Wrong answer (0)			
2 (xi)	What is the leveling effect of water	Writing correct description of leveling effect of water (1.5)	Writing partially correct description (1)	Any relevant information(0.5)	Wrong answer (0)			
	Compensation of leveling effect	Writing correct Compensation of leveling effect (1.5)	Writing partially correct Compensation of leveling effect (1)	Any relevant information (0.5)	Wrong answer (0)			
OR								
2 (xi)	Draw potential energy diagram for exothermic reaction	Drawing correct potential energy diagram for exothermic reaction (1.5)	Drawing partially correct potential energy diagram for exothermic reaction (1)	Any relevant information (0.5)	Wrong answer (0)			
	Draw potential energy diagram for endothermic reaction	Drawing correct potential energy diagram for endothermic reaction (1.5)	Drawing partially correct potential energy diagram for endothermic reaction (1)	Any relevant information (0.5)	Wrong answer (0)			
2(xii)	Rate law equation $R=K[NO]^2[H_2]$ for the reaction $2NO+H_2 \rightarrow N_2+2H_2O$ When oxygen atom is intermediate write reaction mechanism in two steps	Writing correct mechanism in two steps (3)	Writing partially correct mechanism (2)	Any relevant information (1)	Wrong answer (0)			
OR								
2(xii)	How relative lowering of vapour pressure	Writing correct calculation/derivation (3)	Partially Correct calculation/ derivation (2)	Any relevant information(1)	Wrong answer (0)			

Q.# / Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	Level 7 (Marks)
	$\left(\dfrac{\Delta P}{P°} = X_2\right)$ Can be used to calculate molar mass of solute							
2(xiii)	Description of phenol water system	Writing correct description of phenol water system (2)	Partially correct response (1)	Any relevant information(0.5)	Wrong answer (0)			
	Explanation of upper consulate temperature	Writing correct description/ explanation of upper consulate temperature (1)	Partially correct response(0.5)	Wrong answer (0)				
OR								
2(xiii)	Thermo chemical equation for **i.** Standard enthalpy of formation of $CaCO_3$ is -1207Kj/mole	Writing correct thermochemical equation of Standard enthalpy of formation of $CaCO_3$ is -1207Kj/mole (1.5)	Partially correct response (1)	Any relevant information (0.5)	Wrong answer (0)			
	Thermo chemical equation for **ii.** Standard enthalpy of combustion of CH_3COOH is -875Kj/mole	Writing correct thermochemical equation of Standard enthalpy of combustion of CH_3COOH is -875Kj/mole (1.5)	Writing partially correct thermochemical equation of combustion of CH_3COOH is -875Kj/mole (1)	Any relevant information (0.5)	Wrong answer (0)			
2(xiv)	Calculation of E^0_{cell} for Li-Zn cell E^0_{Li} is -3.05V and E^0_{Zn} is 0.76V	Writing correct calculation (1.5)	Partially Correct calculation (1)	Any relevant information(0.5)	Wrong answer (0)			
	Cell reactions For Li-Zn E^0_{Li} is -3.05V and E^0_{Zn} is -0.76V	Writing correct cell reactions (1.5)	Partially Correct reactions (1)	Any relevant information(0.5)	Wrong answer (0)			

Q.# / Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	Level 7 (Marks)
OR								
2(xiv)	Chemical reaction at cathode of alkaline dry cell	Writing correct reaction at cathode of alkaline dry cell (1.5)	Writing partially correct reaction at cathode(1)	Any relevant information (0.5)	Wrong answer (0)			
	Chemical reaction at anode of alkaline dry cell	Writing correct reaction at anode of alkaline dry cell (1.5)	Writing partially correct reaction at anode(1)	Any relevant information (0.5)	Wrong answer (0)			
Q.3.	Description of hybridization	Writing the correct description of hybridization (1)	Writing partially correct description of hybridization (0.5)	Wrong answer (0)				
	Explanation of hybridization of CH_4 with orbital diagram	Writing the correct explanation with orbital diagram of CH_4 (3)	Writing partially correct explanation with diagram of CH_4 (2)	Any relevant information (1)	Wrong answer (0)			
	Explanation of hybridization of $BeCl_2$ with orbital diagram	Writing the correct explanation with orbital diagram of $BeCl_2$ (3)	Writing partially correct explanation with diagram of $BeCl_2$ (2)	Any relevant information (1)	Wrong answer (0)			
OR								
Q.3.	Deviation of real gases from gas laws at low temperature	Writing correct deviation of real gases from gas laws at low temperature (2)	Writing partially correct description (1)	Any relevant information (0.5)	Wrong answer (0)			
	Deviation of real gases from gas laws at high pressure	Writing correct deviation of real gases from gas laws at high pressure (2)	Writing partially correct description (1)	Any relevant information (0.5)	Wrong answer (0)			
	Explanation of the deviation by graphical representation of compressibility factor vs pressure	Correctly representation of graph (3)	Partially correct representation of graph (2)	Any relevant response (1)	Wrong answer (0)			

Q.# / Part #	Criteria	Level 1 (Marks)	Level 2 (Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	Level 7 (Marks)
Q.4.	Statement of first law of thermodynamics with its mathematical expression	Writing correct Statement of first law of thermodynamics with its mathematical expression (2)	Writing partially correct statement of first law of thermodynamics with its mathematical expression (1)	Any relevant information (0.5)	Wrong answer (0)			
	Explanation of first law of thermodynamics for a gas	Writing correct explanation of first law of thermodynamics for a gas (2)	Writing partially correct explanation of first law of thermodynamics for a gas (1)	Any relevant information (0.5)	Wrong answer (0)			
	Derivation of first law of thermodynamics of the formula W=PΔV	Writing correct derivation of the formula W=PΔV (2)	Writing partially correct derivation of the formula W=PΔV (1)	Any relevant information (0.5)	Wrong answer (0)			
OR								
Q.4.	Balance the given redox reaction by oxidation number method i.$HNO_3+H_2S\rightarrow NO+S+H_2O$	Balancing the equation in justified steps (3)	Balancing the equation in some steps (2)	Partially balancing the equation (1)	Any relevant information (0.5)	Wrong answer (0)		
	Balance the given redox reaction by oxidation number method i.$HNO_3+H_2O+P\rightarrow H_3PO_4+NO$	Balancing the equation in justified steps (3)	Balancing the equation in some steps (2)	Partially balancing the equation (1)	Any relevant information (0.5)	Wrong answer (0)		
Q.5.	Description of buffer solution	Writing correct description of buffer solution (1)	Writing partially correct description (0.5)	Wrong answer (0)				

Q.# / Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	Level 7 (Marks)
	Types of buffer solution with composition	Writing correct types of buffer solution with composition (2)	Writing partially correct types of buffer solution with composition (1)	Any relevant information (0.5)	Wrong answer (0)			
	Explanation of buffer action when base is added	Writing correct explanation of buffer action when base is added (3)	Writing partially correct explanation of buffer action when base is added (2)	Any relevant information (1)	Wrong answer (0)			
OR								
Q.5.	Description of colligative properties of solution	Writing correct explanation of colligative properties of solution (1)	Writing correct explanation of colligative properties of solution(0.5)	Wrong answer (0)				
	Explanation of quantitative aspects of freezing point depression with general graphical representation	Writing correct explanation of quantitative aspects of freezing point depression with general graphical representation(3)	Writing partially correct explanation of quantitative aspects of freezing point depression with general graphical representation(2)	Any relevant information (1)	Wrong answer (0)			
	Derivation of molar mass of solute for freezing point depression	Writing correct derivation of molar mass of solute for freezing point depression(2)	Writing partially correct derivation of molar mass of solute for freezing point depression(1)	Any relevant information (0.5)	Wrong answer (0)			
Q.6.	Description of London dispersion forces	Writing correct Description of London dispersion forces (3)	Partially correct response (2)	Any relevant information(1)	Wrong answer (0)			

Q.# / Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	Level 7 (Marks)
	Explanation of any three factors which affect these forces with example	Writing correct explanation of any three factors which affect these forces with example (4)	Writing correct explanation of any two factors with example (3)	Writing correct explanation of any one factor with example (2)	Any relevant information (1)	Wrong answer (0)		
OR								
Q.6.	1st differentiation between cubic close packing and hexagonal close packing in metal	Writing any 1st correct differentiation between cubic close packing and hexagonal close packing in metal (2)	Partially correct response (1)	Any relevant information (0.5)	Wrong answer (0)			
	2nd differentiation between cubic close packing and hexagonal close packing in metal	Writing any 2nd correct differentiation between cubic close packing and hexagonal close packing in metal (2)	Partially correct response (1)	Any relevant information (0.5)	Wrong answer (0)			
	1st comparison between the metallic solids and molecular solids	Writing any 1st correct comparison between the metallic solid and molecular solid (1)	Partially correct response (0.5)	Wrong answer (0)				
	2nd comparison between the metallic solids and molecular solids	Writing any 2nd correct comparison between the metallic solid and molecular solid (1)	Partially correct response (0.5)	Wrong answer (0)				
	3rd comparison between the metallic solids and molecular solids	Writing any 3rd correct comparison between the metallic solid and molecular solid (1)	Partially correct response (0.5)	Wrong answer (0)				

Note: All the markers must know the solutions of all the question items of the question paper before starting marking.

Q.# / Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	Level 7 (Marks)
2 (i)	Calculation of mass of Hydrogen ions (H^+) produced by the ionization of 20g of H_2SO_4 $H_2SO_4 \rightarrow 2H^+ + SO_4^{-2}$	Writing correct calculation of mass of Hydrogen ions (H^+) produced by the ionization of 20g of H_2SO_4 (3)	Partially Correct response (2)	Any relevant information (1)	Wrong answer (0)			
OR								
2 (i)	Calculation of the radius of 3rd orbit for $_2He^{+1}$	Writing correct calculation of the radius of 3rd orbit for $_2He^{+1}$ (3)	Partially Correct response (2)	Any relevant information (1)	Wrong answer (0)			
2 (ii)	Calculation of number of formula units of MgS when10g of Mg reacts with 10g of S Mg + S $\rightarrow$ MgS	Writing correct calculation of number of formula units of MgS when10g of Mg reacts with 10g of S Mg + S $\rightarrow$ MgS (3)	Partially Correct response (2)	Any relevant information (1)	Wrong answer (0)			
OR								
2 (ii)	Calculation of formation of "AgCl" by reacting 100g of "AgNO$_3$ " (At.wt.Ag=107) with a solution of 50g of "NaCl" AgNO$_3$+NaCl$\rightarrow$ AgCl+ NaNO$_3$	Writing correct calculation of formation of "AgCl" by reacting 100g of "AgNO$_3$ "with a solution of 50g of "NaCl" AgNO$_3$+NaCl$\rightarrow$ AgCl+ NaNO$_3$ (3)	Partially Correct response (2)	Any relevant information (1)	Wrong answer (0)			
2 (iii)	Calculation of volume of N_2 gas for 3.01×10^{23} molecules at S.T.P	Writing correct calculation of volume of N_2 gas for 3.01×10^{23} molecules at S.T.P (3)	Partially Correct response (2)	Any relevant information (1)	Wrong answer (0)			

Q.# / Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	Level 7 (Marks)
OR)								
2 (iii)	Justification of given order of energy of sub-shells according to n+l rule (i) 3d> 4s	Writing correct justification of order of energy of sub-shells according to n+l rule (i) 3d> 4s (1.5)	Partially Correct response (1)	Any relevant information (0.5)	Wrong answer (0)			
	Justification of given order of energy of sub-shells according to n+l rule (ii) 2p<3s	Writing correct justification of order of energy of sub-shells according to n+l rule (ii) 2p<3s (1.5)	Partially Correct response (1)	Any relevant information (0.5)	Wrong answer (0)			
2 (iv)	Conversion of energy into frequency (v) in Hz of a photon of light having energy 10^{-10} J	Writing correct Conversion of energy into frequency (v) in Hz of a photon of light has energy 10^{-10} J (1)	Partially Correct response (0.5)	Wrong answer (0)				
	Conversion of energy into wave length (λ) in meter of a photon of light having energy 10^{-10} J	Writing correct Conversion of energy into wave length (λ) in meter of a photon of light has energy 10^{-10} J (1)	Partially Correct response (0.5)	Wrong answer (0)				

Q.# / Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	Level 7 (Marks)
	Conversion of energy into wave number $(\bar{v})$ in m^{-1} of a photon of light having energy 10^{-10} J	Writing correct Conversion of energy into wave number $(\bar{v})$ in m^{-1} of a photon of light has energy 10^{-10} J (1)	Partially Correct response (0.5)	Wrong answer (0)				
OR								
2 (iv)	Justification of statement (i)Bond energy of H-H is greater than Cl-Cl	Writing correct justification of Bond energy of H-H is greater than Cl-Cl (1.5)	Partially Correct response (1)	Any relevant information (0.5)	Wrong answer (0)			
	Justification of statement (ii) Bond energy of H-Br is less than H-Cl	Writing correct justification of Bond energy of H-Br is less than H-Cl (1.5)	Partially Correct response (1)	Any relevant information (0.5)	Wrong answer (0)			
2 (v)	Calculation of percentage of ionic character of HCl bond. The dipole moment of HCl is 1.03D and distance between atoms is 127pm.	Writing correct calculation of percentage of ionic character of HCl bond. (3)	Partially Correct response (2)	Any relevant information (1)	Wrong answer (0)			
OR								

Q.# / Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	Level 7 (Marks)
2 (v)	Prove that Kelvin temperature of a gas is the measurement of average kinetic energy of its molecules. K.E α T	Writing correct derivation of K.E α T (3)	Partially Correct response (2)	Any relevant information (1)	Wrong answer (0)			
2 (vi)	Statement of Charles law.	Writing correct statement of Charles law.(1)	Partially Correct response (0.5)	Wrong answer (0)				
	Derivation of critical form of Charles law $\left[(V_t = \dfrac{V_\circ}{273}T)\right]$	Writing correct Derivation of critical form of Charles law.(2)	Partially Correct response (1)	Any relevant information (0.5)	Wrong answer (0)			
OR								
2 (vi)	Reason / description of a small droplet of water assumes nearly spherical on the surface of a waxy bonnet of car.	Writing correct reason/ description of a small droplet of water assumes nearly spherical on the surface of a waxy bonnet of car.(3)	Partially Correct response (2)	Any relevant information (1)	Wrong answer (0)			
2 (vii)	Description of any 1st application of Dalton's law of partial pressure.	Writing correct Description of any 1st application of Dalton's law of partial pressure.(1.5)	Partially Correct response (1)	Any relevant information (0.5)	Wrong answer (0)			
	Description of any 2nd application of Dalton's law of partial pressure.	Writing correct Description of any 2nd application of Dalton's law of partial pressure.(1.5)	Partially Correct response (1)	Any relevant information (0.5)	Wrong answer (0)			
OR								

Q.# / Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	Level 7 (Marks)
2 (vii)	Comparison of molecular and metallic solid in any 1st way	Writing correct Comparison of molecular and metallic solid in any 1st way (1)	Partially Correct response (0.5)	Wrong answer (0)				
	Comparison of molecular and metallic solid in any 2nd way	Writing correct Comparison of molecular and metallic solid in any 2nd way (1)	Partially Correct response (0.5)	Wrong answer (0)				
	Comparison of molecular and metallic solid in any 3rd way	Writing correct Comparison of molecular and metallic solid in any 3rd way (1)	Partially Correct response (0.5)	Wrong answer (0)				
2 (viii)	Description of any 1st faulty postulate of kinetic molecular theory	Writing correct description of any 1st faulty postulate of kinetic molecular theory (1.5)	Partially Correct response (1)	Any relevant information (0.5)	Wrong answer (0)			
	Description of any 2nd faulty postulate of kinetic molecular theory	Writing correct description of any 2nd faulty postulate of kinetic molecular theory (1.5)	Partially Correct response (1)	Any relevant information (0.5)	Wrong answer (0)			
OR								
2 (viii)	Differentiation between homogenous and heterogeneous equilibrium	Writing correct differentiation between homogenous and heterogeneous equilibrium. (3)	Partially Correct response (2)	Any relevant information (1)	Wrong answer (0)			
2 (ix)	Reason/ description of boiling point of SiH_4 is greater than CH_4	Writing correct Reason/ description of boiling point of SiH_4 is greater than CH_4 (3)	Partially Correct response (2)	Any relevant information (1)	Wrong answer (0)			
OR								

Q.# / Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	Level 7 (Marks)
2 (ix)	K_{sp} expression of (i) $Al(OH)_3$	Writing correct K_{sp} expression of $Al(OH)_3$ (1.5)	Partially Correct response (1)	Any relevant information (0.5)	Wrong answer (0)			
	K_{sp} expression of $Mg_3(PO_4)_2$	Writing correct K_{sp} expression of $Mg_3(PO_4)_2$ (1.5)	Partially Correct response (1)	Any relevant information (0.5)	Wrong answer (0)			
2 (x)	Differentiation of liquid crystal from pure liquids and crystalline solids.	Writing any three correct differentiation of liquid crystal from pure liquids and crystalline solids.(3)	Writing any two correct differentiation of liquid crystal from pure liquids and crystalline solids.(2)	Writing any one correct differentiation of liquid crystal from pure liquids and crystalline solids.(1)	Any relevant information (0.5)	Wrong answer (0)		
OR								
2 (x)	Determination of the precipitation reaction by comparing Q' with K_{sp}	Writing correct determination of the precipitation reaction by comparing Q' with K_{sp}.(3)	Partially Correct response (2)	Any relevant information (1)	Wrong answer (0)			
2 (xi)	K_c expression and units of $C_{(s)} + H_2O_{(g)} \rightleftharpoons CO_{(g)} + H_{2(g)}$	Writing correct K_c expression and units of $C_{(s)} + H_2O_{(g)} \rightleftharpoons CO_{(g)} + H_{2(g)}$ (1.5)	Partially Correct response (1)	Any relevant information (0.5)	Wrong answer (0)			
	K_c expression and units of $3Fe_{(s)} + 4H_2O_{(g)} \rightleftharpoons Fe_3O_{4(s)} + 4H_{2(g)}$	Writing correct K_c expression and units of $3Fe_{(s)} + 4H_2O_{(g)} \rightleftharpoons Fe_3O_{4(s)} + 4H_{2(g)}$ (1.5)	Partially Correct response (1)	Any relevant information (0.5)	Wrong answer (0)			
OR								
2 (xi)	Derivation of the given relationship	Writing correct derivation of the given relationship	Partially Correct response (2)	Any relevant information (1)	Wrong answer (0)			

Q.# / Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	Level 7 (Marks)
	$K_a \times K_b = K_w$ for a conjugate acid base pair	$K_a \times K_b = K_w$ for a conjugate acid base pair(3)						
2(xii)	Description of Order of reaction	Writing correct Description of Order of reaction. (1)	Partially Correct response (0.5)	Wrong answer (0)				
	Description of Initial rate of reaction	Writing correct Description of Initial rate of reaction. (1)	Partially Correct response (0.5)	Wrong answer (0)				
	Description of Average rate of reaction	Writing correct description of Average rate of reaction. (1)	Partially Correct response (0.5)	Wrong answer (0)				
OR								
2(xii)	Description of solvation	Writing correct description of solvation (1)	Partially Correct response (0.5)	Wrong answer (0)				
	Explanation of solvation for ionic compounds.	Writing correct explanation of solvation for ionic compounds. (2)	Partially Correct response (1)	Any relevant information (0.5)	Wrong answer (0)			
2(xiii)	Calculation of mass (w/w) percent of a solution containing 80g of sugar ($C_{12}H_{22}O_{11}$) in 250g of water.	Writing correct calculation of mass (w/w) percent of a solution containing 80g of sugar ($C_{12}H_{22}O_{11}$) in 250g of water. (3)	Partially Correct response (2)	Any relevant information (1)	Wrong answer (0)			
OR								
2(xiii)	Thermo chemical equation from given	Writing correct thermo chemical equation of	Partially Correct response (1)	Any relevant information (0.5)	Wrong answer (0)			

Q.# / Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	Level 7 (Marks)
	information. Standard enthalpy of formation of Fe_2O_3 is -824 Kj/mole	Standard enthalpy of formation of Fe_2O_3 is -824 Kj/mole (1.5)						
	Thermo chemical equation from given information. Standard enthalpy of combustion of CH_3COOH is -875 Kj/mole	Writing correct Thermo chemical equation from given information. Standard enthalpy of combustion of CH_3COOH is -875 Kj/mole (1.5)	Partially Correct response (1)	Any relevant information (0.5)	Wrong answer (0)			
2(xiv)	Balance the half reaction that take place in acidic medium $NO_3^{-1} \rightarrow NO_2$	Correct balancing the half reaction in justified steps that take place in acidic medium $NO_3^{-1} \rightarrow NO_2$ (1.5)	Partially Correct response (1)	Any relevant information (0.5)	Wrong answer (0)			
	Balance the half reaction that take place in acidic medium $ClO_4^{-1} \rightarrow ClO_3^{-1}$	Correct balancing the half reaction in justified steps that take place in acidic medium $ClO_4^{-1} \rightarrow ClO_3^{-1}$ (1.5)	Partially Correct response (1)	Any relevant information (0.5)	Wrong answer (0)			
OR								
2(xiv)	Explanation of dry cell with the help of chemical reaction that occur at anode	Writing correct Explanation of dry cell with the help of chemical reaction that occur at anode (1.5)	Partially Correct response (1)	Any relevant information (0.5)	Wrong answer (0)			
	Explanation of dry cell with the help of chemical reaction that occur at cathode	Writing correct Explanation of dry cell with the help of chemical reaction that occur at	Partially Correct response (1)	Any relevant information (0.5)	Wrong answer (0)			

Q.# / Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	Level 7 (Marks)
		cathode. (1.5)						
Q.3.	Description of hybridization	Writing correct description of hybridization (1)	Partially Correct response (0.5)	Wrong answer (0)				
	Explanation of hybridization of NH_3 molecule with orbital diagram.	Writing correct Explanation of hybridization of NH_3 molecule with orbital diagram. (3)	Partially Correct response (2)	Any relevant information (1)	Wrong answer (0)			
	Explanation of hybridization of BF_3 molecule with orbital diagram.	Writing correct Explanation of hybridization of BF_3 molecule with orbital diagram. (3)	Partially Correct response (2)	Any relevant information (1)	Wrong answer (0)			
OR								
Q.3.	Statement of Dalton's law of partial pressure.	Writing correct statement/description of Dalton's law of partial pressure. (1)	Partially Correct response (0.5)	Wrong answer (0)				
	Derivation of relationship for partial pressure for two supposed gases A and B.	Writing correct derivation of relationship for partial pressure for two supposed gases A and B. (3)	Partially Correct response (2)	Any relevant information (1)	Wrong answer (0)			
	Derivation of relationship for number of moles for two supposed gases A and B.	Writing correct derivation of relationship for number of moles for two supposed gases A and B. (3)	Partially Correct response (2)	Any relevant information (1)	Wrong answer (0)			

Q.# / Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	Level 7 (Marks)
Q.4.	Explanation of construction and working of lead storage battery	Writing correct explanation of construction and working of lead storage battery (2)	Partially Correct response (1)	Any relevant information (0.5)	Wrong answer (0)			
	Reactions that occur at anode and cathode during discharging.	Writing correct Reactions that occur at anode and cathode during discharging.(2)	Writing correct Reactions that occur at anode **or** cathode during discharging. (1)	Any relevant information (0.5)	Wrong answer (0)			
	Reactions that occur at anode and cathode during charging.	Writing correct Reactions that occur at anode and cathode during charging.(2)	Writing correct Reactions that occur at anode **or** cathode during charging. (1)	Any relevant information (0.5)	Wrong answer (0)			
OR								
Q.4.	Prediction of nature of the given salt (Acidic ,basic or neutral) and chemical equation when hydrolyzed in water (i) NH_4NO_3	Writing correct prediction of nature of the given salt (Acidic ,basic or neutral) and chemical equation when hydrolyzed in water NH_4NO_3 (2)	Partially Correct response (1)	Any relevant information (0.5)	Wrong answer (0)			
	Prediction of nature of the given salt (Acidic ,basic or neutral) and chemical equation when hydrolyzed in water (ii) $MgSO_4$	Writing correct prediction of nature of the given salt (Acidic ,basic or neutral) and chemical equation when hydrolyzed in water $MgSO_4$ (2)	Partially Correct response (1)	Any relevant information (0.5)	Wrong answer (0)			
	Prediction of nature of the given salt (Acidic ,basic or neutral) and chemical	Writing correct Prediction of nature of the given salt (Acidic ,basic or neutral) and chemical equation when	Partially Correct response (1)	Any relevant information (0.5)	Wrong answer (0)			

Q.# / Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	Level 7 (Marks)
	equation when hydrolyzed in water (iii) Na_2CO_3	hydrolyzed in water Na_2CO_3 (2)						
Q.5.	Reason of elevation in boiling point when non-volatile solute is added in a solvent.	Writing correct Reason/description of elevation in boiling point when non-volatile solute is added in a solvent.(1)	Partially Correct response (0.5)	Wrong answer (0)				
	Explanation of quantitative aspects of elevation of boiling point when non-volatile solute is added in a solvent.	Writing correct Explanation of quantitative aspects of elevation of boiling point when non-volatile solute is added in a solvent.(3)	Partially Correct response (2)	Any relevant information (1)	Wrong answer (0)			
	Derivation of relationship for molar mass of a solute.	Writing correct derivation of relationship for molar mass of a solute.(2)	Partially Correct response (1)	Any relevant information (0.5)	Wrong answer (0)			
OR								
Q.5.	Description of Hess's law	Writing correct description of Hess's law (1)	Partially Correct response (0.5)	Wrong answer (0)				
	Mathematical expression of Hess's law	Writing correct Mathematical expression of Hess's law (2)	Partially Correct response (1)	Any relevant information (0.5)	Wrong answer (0)			
	Draw energy cycle for the given reaction. $C+O_2 \rightarrow CO_2$	Drawing correct energy cycle for the given reaction. $C + O_2 \rightarrow CO_2$ ΔH°=-393.5KJ	Partially Correct response (2)	Any relevant information (1)	Wrong answer (0)			

Q.# / Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	Level 7 (Marks)
	ΔH^o=-393.5KJ Reaction can be carried out in two steps	Reaction can be carried out in two steps (3)						
Q.6.	Description of hydrogen bonding	Writing correct description of hydrogen bonding (1)	Partially Correct response (0.5)	Wrong answer (0)				
	Explanation of Boiling point of water is higher than HF	Writing correct explanation of Boiling point of water is higher than HF (2)	Partially Correct response (1)	Any relevant information (0.5)	Wrong answer (0)			
	Explanation of Cleansing action of soap	Writing correct explanation of Cleansing action of soap(2)	Partially Correct response (1)	Any relevant information (0.5)	Wrong answer (0)			
	Explanation of Solubility of covalent compounds.	Writing correct explanation of Solubility of covalent compounds. (2)	Partially Correct response (1)	Any relevant information (0.5)	Wrong answer (0)			
OR								
Q.6.	Description of unit cell	Writing correct description of unit cell (1)	Partially Correct response (0.5)	Wrong answer (0)				
	Calculation of number of Na^+ in one unit cell of Sodium Chloride	Writing correct calculation of number of Na^+ in one unit cell of Sodium Chloride. (3)	Partially Correct response (2)	Any relevant information (1)	Wrong answer (0)			

Q.# / Part #	Criteria	Level 1 (Marks)	Level 2(Marks)	Level 3 (Marks)	Level 4 (Marks)	Level 5 (Marks)	Level 6 (Marks)	Level 7 (Marks)
	Calculation of number of Cl⁻ in one unit cell of Sodium Chloride	Writing correct calculation of number of Cl⁻ in one unit cell of Sodium Chloride. (3)	Partially Correct response (2)	Any relevant information (1)	Wrong answer (0)			

Note: All the markers must know the solutions of all the question items of the question paper before starting marking.