Federal Board SSC-I Examination
Chemistry Model Question Paper
(Curriculum 2022-2023)

ROLL NUMBER					
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Version No.			
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Section - A (Marks 12)

Time Allowed: 20 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.

Candidate Sign._____ **Invigilator Sign**. _____

Q1. **Fill the relevant bubble against each question according to curriculum**. **Each part carries one mark.**

	Question	A	B	C	D	A	B	C	D
(i)	Suggest the primary focus of organic chemistry?	The behavior of inorganic salts	The study of carbon-based molecules and their reactions	The study of metals and alloys	The properties of gases and their interactions	▯	▯	▯	▯
(ii)	Which of the following elements has the largest atomic size?	Fluorine	Oxygen	Chlorine	Bromine	▯	▯	▯	▯
(iii)	Identify the covalent compound.	MgO	CaO	H_2O	KF	▯	▯	▯	▯
(iv)	Suggest the correct reagents in the reduction of alkyl halides.	Al_2O_3 at 35^0C	Conc.H_2SO_4 at 170^0C	Zn + Dust	Zn + HCl	▯	▯	▯	▯
(v)	Identify which of the following element in the given reaction is oxidized $H_2S+Cl_2 \rightarrow 2HCl + S$	H	Cl	S	S and Cl_2	▯	▯	▯	▯
(vi)	Why is the proton number unique to each element and used to arrange elements in the periodic table?	Protons determine the mass of the element	Protons define the atomic number of the element	Protons dictate the number of neutrons in the nucleus	Protons indicate the number of electrons in the atom	▯	▯	▯	▯
(vii)	Predict which one of the following pairs has the same mass?	1 mole of N_2O and 1 mole of CO_2	1 mole of H_2 and 1 mole NH_3	1 mole of H_2O and 1 mole of H_2O_2	1 mole of H_2SO_4 and 1 mole of HNO_3	▯	▯	▯	▯
(viii)	Element X belongs to Group VII of the periodic table. Which of the following properties is most likely associated with Element X?	High reactivity with water.	Has electropositive character.	Exists as a diatomic gas at room temperature.	Forms covalent compounds with metals.	▯	▯	▯	▯
(ix)	Identify the compound which is unsaturated.	CH_3CH_2OH	CH_4	$CH_3CH=CH_2$	$CH_3CH_2NH_2$	▯	▯	▯	▯
(x)	General formula of carboxylic acid is	RCHO	ROR	RCOOH	RCOR	▯	▯	▯	▯
(xi)	Which compound is most likely to damage marble buildings due to the reaction with acid rain?	$CaSO_4$	$Ca(NO_3)_2$	$CaCO_3$	CaC_2O_4	▯	▯	▯	▯
(xii)	Suggest which statement about solubility is **INCORRECT**?	It refers to the ability of a solute to dissolve in a solvent	It is measured in grams per liter of solvent	It is affected by temperature, pressure, and the nature of the solute and solvent.	It is independent of temperature.	▯	▯	▯	▯

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Time allowed: 2.40 hours Total Marks: 53

Note: Answer all parts from Section 'B' and all questions from Section 'C' on the **E-sheet**. Write your answers on the allotted /given spaces.

SECTION–B (Marks 33)

Q. 2	**Attempt the following questions**			**(11x3 = 33)**	
(i)	Write equation(s) which represents the dissociation of H_2SO_4 in water.	1.5+ 1.5	**OR**	Draw structural formula of following molecules. a. Benzene b. Ethanol c. Propanone	1.+1 +1
(ii)	Predict reactions of Cl_2 with following halide ions. a. Br^{-1} b. I^{-1}	1+1+ 1	**OR**	Determine neutron and proton number of following elements. a. $^{27}_{13}X$ b. $^{36}_{18}Y$ c. $^{64}_{30}Z$	1.5+ 1.5
(iii)	Compare following properties of liquid Crystals with liquids. a. Molecular arrangement b. Fluidity	1.5+ 1.5	**OR**	Identify oxidizing agents in each of the following reactions. a.$2NH_3+3CuO \rightarrow 3Cu+N_2+3H_2O$ b. $2FeCl_2+Cl_2 \rightarrow 2FeCl_3$	1.5+ 1.5
(iv)	How do NO and NO_2 contribute to the chemical reactions that lead to acid rain?	1.5+ 1.5	**OR**	How can exothermic reactions be distinguished from endothermic reactions. Explain by giving examples.	1.5+ 1.5
(v)	How do following water pollutants effect living organisms? 1. House hold wastes 2. Agricultural wastes 3. Metals	1+1+ 1	**OR**	How can sunlight be important in substitution reaction of methane with chlorine? Explain with reactions.	1+2
(vi)	Give three examples of transition metals where they act as catalysts.	1+1+ 1	**OR**	What are the primary nutrients provided by urea, ammonium salts, and nitrates when used as fertilizers?	1+1 +1
(vii)	Write general formulas of the following homologous series. Give one example in each case. a) Alkanes b) Alkenes c) Alcohols	1+1+ 1	**OR**	Identify the group and period number of the following unknown elements. a. $^{12}_{6}A$ b. $^{39}_{19}B$ c. $^{19}_{9}C$	1+1 +1
(viii)	Consider following equilibrium. $CoCl_2.2H_2O(s) + Heat \rightleftharpoons CoCl_2(g) + H_2O(g)$ Predict the direction of reaction when following changes are applied on this system at equilibrium. a. Heating the system. b. Addition of water c. Removal of water	1+1+ 1	**OR**	Describe carbohydrates as more efficient source of energy than fats and proteins.	03
(ix)	Give the ways a closed system contribute to the establishment of equilibrium in reversible reactions?	03	**OR**	Define Bronsted-Lowry acids and bases with two examples each.	03
(x)	Calculate the number of atoms in each of the following samples. a. 3.4 moles of nitrogen gas b. 15 g of Sodium metal	2+1	**OR**	How does the energy profile diagram for an endothermic reaction differ from that of an exothermic reaction in terms of activation energy and enthalpy change?	1.5+ 1.5
(xi)	Define isotopes of an element. Write isotopes of hydrogen, give their atomic and mass numbers.	1+2	**OR**	Define following branches of chemistry. a. Astrochemistry b. Geochemistry c. Physical chemistry	1+1 +1

SECTION– C (Marks20)

Note: Attempt all questions. Marks of each question are given along with each question.

Q.3	Predict the trend of atomic size, ionization energy and electronegativity of group IIA of periodic table by using knowledge of chemical periodicity.	2+2+2	**OR**	Draw the dot-and- cross diagrams and Lewis dot structures for the following compounds. HCN, MgO, C_2H_4	2+2+2
Q.4	Describe reactions of HCl with the following. A. Zn B. NaOH C. Na_2CO_3	2x3	**OR**	How alkanes can be prepared from the following and also mention the type of reactions in each case. A. $CH_3 – CH = CH_2$ B. CH_3-C≡C-CH_3 C. $CH_3CH_2CH_2Cl$	2x3
Q.5	Write down the formula of following compounds. a. Ferric chloride b. Sodium sulphate c. Magnesium chloride d. Sulphur dioxide	4	**OR**	Define oxidation and reduction in terms of: a. oxygen and hydrogen b. gain and loss of electrons (change in oxidation state).	2+2
Q.6	Define solubility. How can it be affected by the change in temperature? Explain with graph.	1+1+2	**OR**	Identify sources of lipids and their recommended daily intake for young adults.	2+2

SLOs of Model Paper

Chemistry--- Grade—IX (SSC-I)

Sr. N0	SLOs	Marks	Domain	Cognitive level
(i)	SLO: C-09-A-02 Explain with examples that chemistry has many subfields and example, and interdisciplinary fields.	01	A	U
(ii)	SLO: C-09-C-05 Identify trends in group and periods, given information about the elements, including trends for atomic radius, electron affinity, electronegativity, ionization energy, metallic character.	01	C	U
(iii)	SLO: C-09-B-34 Differentiate between ionic compounds and covalent compounds.	01	B	U
(iv)	SLO: C-09-E-14 Describe, using symbol equations, preparation of alkanes from cracking of larger hydrocarbons, hydrogenation of alkenes and alkynes, and reduction of alkyl halide.	01	E	U
(v)	SLO: C-09-B-57 Identify that the oxidation number of monatomic ion is the same as the charge on the ion.	01	B	K
(vi)	SLO: C-09-B-17 Explain that the proton number is unique to each element and used to arrange elements in periodic table.	01	B	U
(vii)	SLO: C-09-B-47 Use the relationship amount of substance = mass / molar mass to calculate number of moles, mass, molar mass, relative mass (atomic/molecular/formula) and number of particles.	01	B	A
(viii)	SLO: C-09-C-08. Deduce the nature, possible position in the Periodic Table and the identity of unknown elements from given information about their physical and chemical properties.	01	B	A
(ix)	SLO: C-09-E-09 State that an unsaturated compound has molecules in which one or more carbon-—carbon bonds are not single bond.	01	E	K
(x)	SLO: C-09-E-04 interpret general formulae of compounds in the same homologous series including alkanes, alkenes, alkynes, alcohols and carboxylic acids.	01	E	U
(xi)	SLO: C-09-D-05. Describe the role of sulfur in the formation of acid rain and its impact on the environment.	01	B	U
(xii)	SLO: C-09-B-07 Explain the effect of temperature on solubility and formation of unsaturated and saturated solutions.	01	B	U

Cognitive Level

*K= Knowledge

*U= Understanding

*A= Application

SECTION – B (Marks 33)

Sr No	SLO	Marks	Domain	Cognitive level		SLO	Marks	Domain	Cognitive level
(i)	SLO: C-09-B-78 Formulate dissociation equations for an acid or base in aqueous solution.	1.5 + 1.5	B	**A**	**OR**	SLO: C-09-E-03 Identify and draw structural formulae for molecules.	1+1 +1	E	A
(ii)	SLO: C-09-C-14 Explain the displacement reactions of halogens with other halide ions and also as reducing agents.	1.5 + 1.5	C	**U**	**OR**	SLO: C-09-B-22. Determine the number of protons and neutrons of different isotopes.	1.5 + 1.5	B	U
(iii)	SLO: C-09-B-03 Identify that state is a distinct form of matter (examples could include familiarity with plasma, intermediate states and exotic states e.g. BEC or liquid crystals).	1.5 + 1.5	B	**U**	**OR**	SLO: C-09-B-54 Identify oxidizing and reducing agents in a redox reaction.	1.5 + 1.5	B	U
(iv)	SLO: C-09-D-07 Describe the role of NO and NO2 in the formation of acid rain, both directly and through their catalytic role in the oxidation of atmospheric sulfur dioxide.	1.5 + 1.5	D	**U**	**OR**	SLO: C-09-B-63 Differentiate between exothermic and endothermic reactions by giving examples.	1.5 + 1.5	B	U
(v)	SLO: C-09-D-17 Recognize that some naturally occurring substances in water are potentially harmful. (Some examples include: **a**. some metal compounds that are toxic, **b**. some plastics that harm aquatic life. **c**. sewage that contains harmful microbes which cause diseases. **d**. nitrates and phosphates that lead to deoxygenation of water and damage to aquatic life. Details of the eutrophication process are not required).	1+1 +1	D	**U**	**OR**	SLO: C-09-E-13 Describe the substitution reaction of alkanes with chlorine as a photochemical reaction, and draw the structural or displayed formulae of the products, limited to mono substitution	1+ 2	E	U
(vi)	SLO: C-09-C-17. Describe Transition elements as metals that: have high densities, high melting points, variable oxidation numbers, form colored compounds and act as catalysts for industrial purposes. (some examples include catalysts being used are the Haber process, catalytic converters, Contact process and manufacturing of margarine).	1+1 +1	C	**K**	**OR**	SLO: C-09-D-22 State that urea, ammonium salts and nitrates are used as fertilizer.	1+1 +1	D	**K**

(vii)	SLO: C-09-E-04 Interpret general formulae of compounds in the same homologous series including alkanes, alkenes, alkynes, alcohols and carboxylic acids.	1+1 +1	E	**U**	**OR**	SLO: C-09-C-02 Identify the group or period or block of an element using its electronic configuration.	1+1 +1	C	**U**
(viii)	SLO: C-09-B-73 Describe how changing the physical conditions of a chemical equilibrium system can redirect reversible reactions. **a.** effect of heat on hydrated equilibrium **b.** addition of water to anhydrous substances in particular copper(ll) sulfate and cobalt (11) chloride	1+1 +1	B	**K**	**OR**	SLO: C-09-E-17 Identify carbohydrates as a source of energy.	03	E	K
(ix)	SLO: C-09-B-74 State that reversible reaction can achieve equilibrium in a closed system when rate of forward and backward reactions are equal.	03	B	**K**	**OR**	SLO: C-09-B-75 Define Bronsted-Lowry acids as proton donors and Bronsted-Lowry bases as proton acceptors.	03	B	K
(x)	SLO: C-09-B-47 Use the relationship amount of substance = mass / molar mass to calculate number of moles, mass, molar mass, relative mass (atomic/molecular/formula) and number of particles.	1.5 + 1.5	B	**A**	**OR**	SLO: C-09-B-67 Draw, label and interpret reaction pathway diagram for exothermic and endothermic reaction which includes enthalpy change, activation energy (un-catalyzed and catalyzed), reactants and products.	1.5 + 1.5	B	A
(xi)	SLO: C-09-B-20 State that Define isotopes as different atoms of the same element that have same number of protons and different neutrons.	1+ 2	B	**K**	**OR**	SLO: C-09-A-02.Explain with examples that chemistry has many sub-fields and example, and interdisciplinary fields.(Some examples includes).Biochemistry. Medicinal Chemistry. Polymer Chemistry. Geochemistry. Environmental Chemistry. Analytical Chemistry. Physical Chemistry. Organic Chemistry. Inorganic Chemistry. Nuclear Chemistry. Astrochemistry).	1+1 +1	A	K

SECTION – C (Marks 20)

Note: Attempt the following questions.

Sr. No	SLO	Marks	Domain	Cognitive level		SLO	Marks	Domain	Cognitive level
Q.3	SLO: C-09-C-07 Predict the characteristic properties of an element in a given group by using knowledge of chemical periodicity	2+2+2	C	**A**	**OR**	SLO: C-09-B-41 Draw the structure of ionic and covalent compounds along with their formation. (some examples can include: a. ionic bonds in binary compounds such as NaBr, NaF, $CaCl_2$ using dot-and-cross diagrams	2+2+2	B	**A**
Q.4	SLO: C-09-B-80 Describe the characteristic properties of acids in terms of their reactions with metals, bases and carbonates.	2+2+2	B	**U**	**OR**	SLO: C-09-E-14 Describe, using symbol equations, preparation of alkanes from cracking of larger hydrocarbons, hydrogenation of alkenes and alkynes, and reduction of alkyl halides	2+2+2	E	**U**
Q.5	SLO: C-09-B-42 State the formulae of common elements and compounds	04	B	**K**	**OR**	SLO: C-09-B-52 Define redox reactions as simultaneous oxidation and reduction in terms of oxygen, hydrogen, electrons and changes in oxidation state	2+2	B	**K**
Q.6	SLO: C-09-B-07 Explain the effect of temperature on solubility and formation of unsaturated and saturated solutions	1+1+2	B	**U**	**OR**	SLO: C-09-E-16 Recognize the main biomolecules; carbohydrates, proteins, lipids and nucleic acids. their sources, along with the required daily intake for young adults	2+2	E	**U**

Table of Specification of the Model Paper Chemistry----- Grade – IX (SSC-I)

Content Domains **Cognitive Levels**	**Nature of Science in Chemistry**	**Matter**	**Atomic Structure**	**Chemical Bonding**	**Stoichiometry**	**Electro chemistry**	**Energetics**	**Chemical Equilibrium**	**Acids, Bases chemistry and pH**	**Periodic Table and Periodicity**	**Group Properties and Elements**	**Environmental Chemistry-Air**
Knowledge	Q2(xi/s) (3)		Q2(xi/f) (3)		Q5(f) (4)	Q1(v) (1) Q5(s) (4)		Q2(ix/f) (3) Q2(viii/f) (3)	Q2(ix/s)(3)		Q2(vi/f) (3)	
Understanding	Q1(i) (1)	Q2(iii/f) (3) Q1(xii) (1) Q6(f) (4)	Q1(vi) (1) Q2(ii/f) (3)	Q1(iii) (1)		Q2(iii/s) (3)	Q2(iv/s) (3)		Q4(f) (6)	Q2(vii/s) (3) Q1(ii) (1)	Q2(ii/s) (3)	Q1(xi) (1) Q2(iv/f) (3)
Application				Q3(s) (6)	Q1(vii) (1), Q2(x/f) (3)		Q2(x/s) (3)		Q2(i/f)(3)	Q3(f) (6) Q1(viii) (1)		
Total	04	08	07	07	08	08	06	06	12	11	**06**	04
Percentage	**03**	**07**	**06**	**06**	**07**	**07**	**05**	**05**	**10**	**10**	**05**	**03**

Cont….

Table of Specification of the Model Paper Chemistry----- Grade – IX (SSC-I)

Content Domains **Cognitive Levels**	**Environmental Chemistry-Water**	**Organic Chemistry**	**Hydrocarbons**	**Biochemistry**	**Scientific Notation/Standard Form**	**Separation Techniques**	**Qualitative Analysis**	**Chromatography**	**Total marks for each Assessment Objective**	**%age**
Knowledge	Q2(vi/s) (3)	Q 1(ix) (1)		Q2(viii/s) (3)	**Formative for theory and only two, SLO C-09-F-04 and SLO C-09-F-09 are Summative for PBA**	**Summative for PBA**	**Summative for PBA**	**Summative for PBA**	34	29 %
Understanding	Q2(v/f) (3)	Q2(vii/f) (3)	Q 1(iv) (1) Q 1(x) (1) Q2(v/s) (3) Q4 (s)(6)	Q6(s) (4)					58	49 %
Application		Q2(i/s) (3)							26	22 %
Total marks for each Topic/Subtopic	06	07	11	07	00	00	00	00	118	-
Percentage	**05**	**06**	**09**	**06**	**00**	**00**	**00**	**00**	-	**100%**

Note:

1 This ToS does not reflect policy, but it is particular to this model question paper.
2 Proportionate / equitable representation of the content areas may be ensured.
3 The percentage of cognitive level is 30%, 50%, and 20% for knowledge, understanding, and application, respectively with **± 5%** variation.
4 While selecting alternative questions for Short Response Questions (SRQs) and Extended Response Questions (ERQs), it must be kept in mind that:
- Difficulty levels of the two alternative questions of the internal choice will be same
- SLOs of the two alternative questions of the internal choice must be different

Key: Question Number (part/ first choice) marks example: Q2 (i / f)3 , Question Number (part/ second choice) marks Q2 (i / s) 3