CHEMISTRY

CLASS XII

DESIGN OF THE QUESTION PAPER

Time : 3 Hrs. **Max. Marks : 70**

The weightage of the distribution of marks over different dimensions of the question paper shall be as follows :

1. Weightage to Learning Outcomes

S.NO.	OBJECTIVE	MARKS	PERCENTAGE
1.	Knowledge (K)	21	30
2.	Understanding (U)	35	50
3.	Application and skill (A&S)	14	20
	TOTAL	**70**	**100**

2. Weightage to Content/Subject units

	UNIT	MARKS
I.	Atomic Structure and Chemical Bonding	5
II.	The Solid state	4
III.	Solution'	4
IV.	Thermodynamics	4
V.	Electrochemistry	5
VI.	Chemical Kinetics	4
VII.	Surface Chemistry	3
VIII.	p-Block Elements	7
IX.	d-and f - Block elements	3
X.	Coordination Compounds and Organomentallics	3
XI.	Nuclear Chemistry	3

UNIT	MARKS
XII. Stereo Chemistry	2
XIII. Organic Compounds with Functional Groups containing Oxygen -I	2
XIV. Organic Compounds with Functional Groups containing Oxygen - II	4
XV. Organic Compounds with Functional Groups containing Nitrogen	4
XVI. Polymers	2
XVIL Biomolecules	5
XVIII. Chemistry in everyday life	3
Total	**70**

3. Weightage to form of questions

S.No.	Form of questions	Marks for each question	No. of question	Total marks
1.	Long Answer Type Qs.(LA)	5	3	15
2.	Short Answer Qs. II (SAII)	3	12	36
3.	Short Answer Qs. I (SAI)	2	7	14
4.	Very Short Answer Type Qs. (VSA)	1	5	5
	Total	-	**27**	**70**

Note : The expected length of answer and time taken under different forms of questions shall be as follows :

S.NO.	Form of Question	Expected Length	Expected time for each question	Total Expected time
1.	VSA Type	One word to one sentence	2 Minutes	10 Minutes
2.	SA-I Type	20 to 30 words	5 Minutes	35 Minutes
3.	SA-II Type	30 to 40 words	7 Minutes	84 Minutes
4.	E/LA Type	70 to 80 words	15 Minutes	45 Minutes
			Total Time	**174 Minutes**

This is only an approximation. Though the students are advised to be as near the approximation as possible the actual length, however may vary. As the total time is calculated on the basis of the number of questions required to be answered and the lengths of their anticipated answers, it would therefore, be advisable for the candidates to manage their time properly by avoiding details not required.

4. Scheme of Options

(1) There will be no overall choice

(2) Internal choice (either/or type) in three questions is to given in questions testing higher mental abilities in the following types of questions :

(i) One in two marks questions (SA-I Type)

(ii) One in three marks questions (SA-II Type)

(iii) One in five marks questions (E/LA Type)

5. Guidelines for evaluation in organic chemistry units and numericals.

i) Organic Chemistry Units :

a. Two conversions involving not more than 2 steps each 2 marks

OR

One application question on conversions involving four unknown compounds

b.	Two distinctions	2 marks
c.	IUPAC nomenclature	1 mark
d.	Reasoning questions	2 marks
e.	Mechanism	1 mark
f.	Name Reactions	2 marks
g.	Stereochemistry	2 marks
		12 marks

ii) Numericals

Weightage of about 12 marks in total has been assigned to numericals.

6. Weightage to difficulty level of questions

S.No.	Estimated difficulty level	Percentage
1.	Easy	15
2.	Average	70
3.	Difficult	15

A question may vary in difficulty level from individual to individual. As such, the approximation in respect of each question will be made by the paper setter on the basis of general expectation from the group as a whole taking the examination. This provision is only to make the paper balanced in nature rather than to determine the pattern of marking at any stage.

SAMPLE QUESTION PAPER -I

CHEMISTRY

CLASS XII

Time : 3 Hours **Max. Marks : 70**

General Instructions

(i) All questions are compulsory

(ii) Marks for each question are indicated against it.

(iii) Question number 1 to 5 are very short-answer question, each of one mark. Answer these in one word or about one sentence each.

(iv) Question numbers 6 to 12 are short answer questions of two marks each. Answer these in about 30 words each.

(v) Question number 13 to 24 are short answer questions of 3 marks each. Answer these in about 40 words each.

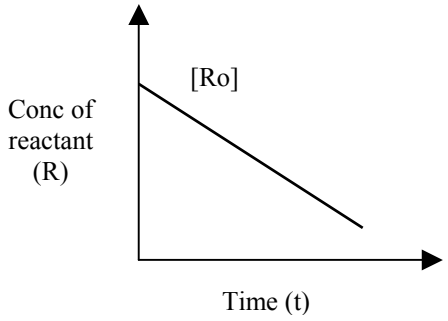
(vi) Question numbers 25 to 27 are Long-answer questions of 5 marks each. Answer these in about 70 words each.

(vii) Use log tables if necessary. Calculators are not permitted.

1. How many effective sodium ions are located at the centers of faces of a unit cell in a sodium chloride crystal? 1

2. A reaction :

Reactant ⟶ Product is represented by



Predict (i) the order of the reaction in this case 1

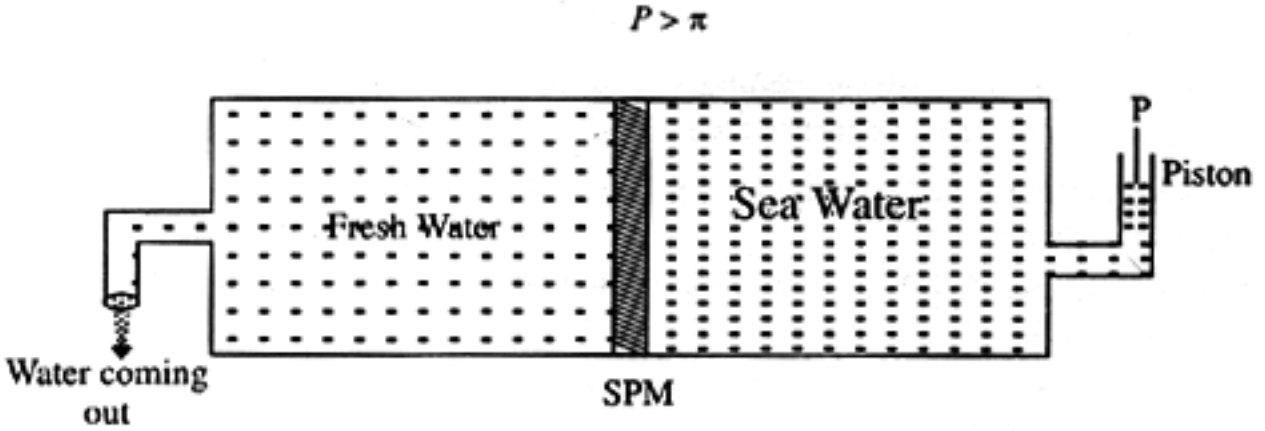
(ii) what does the slope of the graph represent

3. Propose the mechanism for the following reaction :

$$CH_3CHO + HCN \xrightarrow{H^+} H_3C\text{-}\underset{\displaystyle OH}{\underset{|}{CH}}\text{-}CN$$ 1

4 Write the IUPAC name of the compound 1

5 Carefully examine the diagram and name the process involved : 1



6 Identify the type of inter I molecular forces that exist between the following pairs :

(i) Na^+ ion and water molecules

(ii) Ag^+ ion and I^- ion 2

(iii) Argon and Argon

(iv) HF and H_2O

7 Predict the entropy change (Positive/Negative) in the following :

(i) A liquid substance crystallises into a solid

(ii) Temperature of crystal is increased.

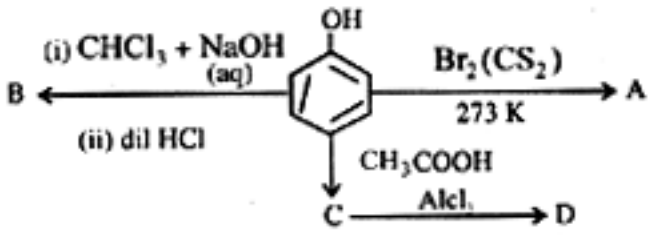
(iii) $\underset{(s)}{CaCO_3} \longrightarrow \underset{(s)}{CaO} + \underset{(g)}{CO_2}$

(iv) $\underset{(g)}{N_2(1atm)} \longrightarrow \underset{(g)}{N_2(0.5atm)}$

8 How is $\left[(CH_3)_2SiO\right]_n$ prepared? Write its two applications. 2

9 What is a stereospecific reaction? Give one example of this reaction. 2

10 Identify A, B, C and D in the following reactions.



1 2

OR

Write the reactions and conditions involved in the following conversions?

(i) Acetic acid into ethyl alcohol 2

(ii) Cumene into phenol

11 " The presence of benzoquinone inhebits the free rodical polymerisation of a Vinyl derivative" Explain. 2

12. What are anomers? How many anomers of glucose are known? Name them. 2

13. (a) Calculate the energy of photon which is necessary to raise an electron in hydrogen atom from n=1 to n=3 energy level? (Given the ionization energy of hydrogen atom is $1.312 \times 10^3 \times 5 mol^{-1}$ and $N_A = 6.02 \times 10^{23} mol^{-1}$).

(b) Which of the followihng excitations requires maximum energy? 2

$n_1 \longrightarrow n_2$

$n_2 \longrightarrow n_3$

$n_3 \longrightarrow n_4$ 1

or – all require the same energy

OR

13. (a) Suppose the velocities of an electron and a rifle bullet of mass 0.03kg are each measured with an uncertainity of $\Delta v = 10^{-3} ms^{-1}$ calculate the minimum uncertainities in their positions.
(Given : mass of an electron = 9.1×10^{-31} kg) 2

(b) Comment on the calculated values of uncertainities in positions inthe two cases. 1

14. Explain the folloiwng terms with suitable examples :

(i) Ferrimagnetism

(ii) n – type semiconductor

(iii) forbidden zone 3

Q.15 The Henry law constant for oxygen dissolved in water is 4.34×10^4 atm at 25°C. If the partial pressure of oxygen in air is 0.2 atm. under ordinary atmospheric conditions. Calculate the concentration (in moles per litre) of dissolved oxygen in water in equilibrium with air at 25°C. 3

Q.16 At elevated temperatures, HI decomposes according to the chemical equation :

$$2HI(g) \longrightarrow H_2(g) + I_2(g)$$

at 443°C. The rate of the reaction increases with concentration of HI, as shown in the following table :

	1	2	3
HI ($mol\ L^{-1}$)	0.005	0.01	0.02
Rate ($mol\ L^{-1}\ s^{-1}$)	7.5×10^{-4}	3.0×10^{-3}	1.2×10^{-2}

(a) Determine (i) order of this reaction and (ii) write the rate expression. 3

(b) Calculate the rate constant and give its units.

Q.17 (a) Among the iron complexes, $K_3[Fe(CN)_6]$ shows very low paramagnetism whereas $K_3[FeF_6]$ is highly paramagnetic explain.

(b) Define crystal field orbital splitting energy.

(c) Write the shape of $Fe(CO)_5$ molecule.

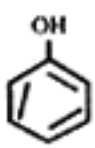
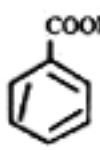
Q.18 Represent the following using a nuclear equation each : 3

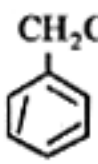
(i) Production of C-14 in nature

(ii) β - emission

(iii) K - capture

Q.19 Write chemical tests to distinguish the following pair of compounds :

(a) (i)  and 

(ii)  and CH_3COCH_3

(b) Write a chemical equation examplefying Clemmensen reduction. 3

Q.20 Give reasons of the following : 3

(a) (i) The basic strength of aliphatic amines in solution is in the order s sec> tert > primary.

(ii) Nitro compounds have higher boiling point than hydrocarbons having ≈ same molecular mass.

(b) By giving an example describe carbylamine reaction.

Q.21 (a) Which bonds in the back bone of a peptide can rotate freely and which cannot? Give reasons.

(b) Write one difference between parallel and antiparallel β pleated sheets.

Give one example of parallel β pleated sheet. 3

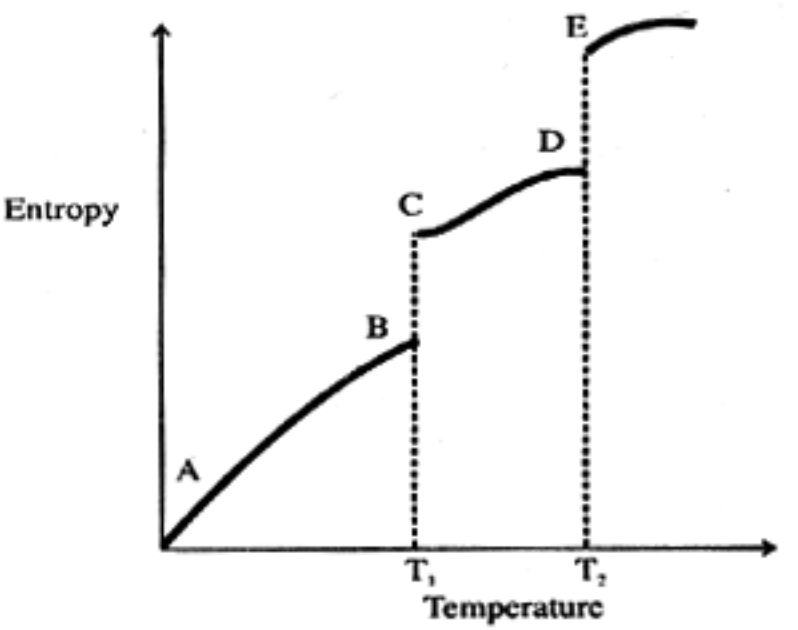
Q.22 Answer the following :

(a) " An unknown fibre (A) is stronger than steel, stiffer than titanium and lighter than aluminium". What could the fibre (A) be?

(b) Why are liquid propellants favoured over solid propellants?

(c) What type of medicines are Omeprazole and Lansoprazole? 3

23. The Change in entropy with respect to temperature in case of a sample is graphically represented below :



Carefully analyse the graph and answer the following : 3

(i) What does T_1 and T_2 indicate ?

(ii) What does AB Curve show ?

(iii) What does BC curve show ? Why temperature does not change?

24. Describe the following giving one example each :

(a) Mechanism of heterogeneous catalysis

(b) Hardy Schulze Rule (1½ + 1½)

25. (a) Write the reactions Occurring during the electrolysis of :

(i) Sulphuric acid at the anode.

(ii) Aqueous Silver Nitrate soution using silver electrodes.

(iii) Aqueous sodium chloride Solution.

(b) (i) Write the anodic and cathodic reactions involved during the discharging of lead storage battery.

(ii) How many Faradays of electric charge is involved per mole of H_2SO_4 consumed. when the lead storage battery is in use? (3,2)

OR

(a) In the Leclanche cell write the following :

(i) The chemical equations involved at the cathode.

(ii) Change in the Oxidation state of Mn.

(iii) The complex entity formed between Zn^{2+} (aq) and NH_3 (g) (1, ½, ½)

(b) In a hydrogen – oxygen fuel cell write the reactions involved at the anode and the cathode. (1)

(c) How will the value of Ecell change in an electrochemical cell involving the following reaction if the concentration of Ag^+(aq) is increased? $Mg(s) + 2Ag^+(aq) \longrightarrow Mg^{2+}(aq) + Ag(s)$ (1)

(d) Why is mercury cell used in hearing aids? (1)

26 (a) Identify the species from A to D in the extradition of silver from its ore (A)

$$(A) \xrightarrow[H_2O\ (l)]{CN^-(aq),\ O_2(g)} (B) \xrightarrow{Zn(s)} (C) + (D) \qquad (2)$$

(b) Give reasons for the following :

(i) With d^4 configuration Cr^{2+} is reducing whereas Mn^{3+} is oxidising.

(ii) Interstitial compounds are well known for transition metals.

(iii) The highest oxidation state of a metal is exhibited in oxides and fluorides. (3)

27. Account for the following :-

i) All the bonds in PCl_5 are not equivalent.

ii) Sulphur in vapour state exhibits paramagnetism.

iii) Fluorine is the strongest oxidant amongst the halogens.

iv) Among the noble gases, only xenon is known to form true chemical compounds.

v) PbO_2 is a stonger oxidising agent than SnO_2. (5)

SAMPLE QUESTION PAPER–II

CHEMISTRY

Class – XII

Time : 3 Hours **Max. Marks : 70**

General Instructions :

(i) All questions are compulsory

(ii) Marks for each question are indicated against it.

(iii) Question numbers 1 to 5 are very short-answer questions each of one mark. Answer these in one word or about one sentence each.

(iv) Question numbers 6 to 12 are short answer questions of two marks each. Answer these in about 30 words each.

(v) Question numbers 13 to 24 are short answer questions of 3 marks each. Answer these in about 40 words each.

(vi) Question numbers 25 to 27 are Long-answer questions of 5 marks each. Answer these in about 70 words each.

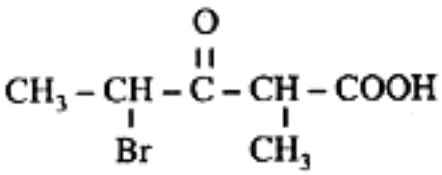
(vii) Use log tables if necessary. Calculators are not permitted.

1. Give one example of Peizoelectric substance. 1

2. What type of azeotrope is formed on mixing nitric acid and water? 1

3. State the unit of 'rate constant' in a zero order reaction. 1

4. Write IUPAC name of : 1



5. Write one chemical test to distinguish between a primary and a secondary nitropropane. 1

6. Write the MO configuration of diatomic molecule of the element with atomic number 9. Calculate its bond order and predict its magnetic behaviour. 2

7. $N_2(g) + O_2(g) \longrightarrow 2NO(g)$ is an endothermic reaction yet it is spontaneous. Explain the reason. 2

8. With the help of a diagram explain the difference in the variation of molar conductivity with concentration for strong and weak electrolytes. 2

9. Aluminium is significantly electropositive metal still it is used as a structural material. Explain the properties of Aluminium which make it suitable for this use. 2

10. Optically active 2-iodobutane on tretment with Na in acetone gives a product which does not show optical activity. Explain. 2

11. Write the steps and conditions to carry out the following conversions : 2

(i) Phenol to Benzoic Acid

(ii) 2 - Methyl - 1 penten to 2 - Methyl - 2- pentanol

OR

An organic compound A (molecular formula C_4H_8O when reduced with $NaBH_4$ gives compound B which reacts with HBr to form compound C (optically active). Identify A,B,C, and write the two enantiomers of compound C.

12. Write the (i) names and (ii) structures of monomers present in the followingpolymers 3

(i) PMMA (ii) Buna – N

13. Calculate (i) frequence and (ii) wave number of the radiations required for the excitation of the electron in hydrogen atom from second to third energy level. Ionization energy of hydrogen atom is 1.12×10^3kJ mol^{-1}. 3

14. An element has a face centred cubic (f.c.c) structure with a cell edge of 0.2nm Calculate its density in g cm^{-3} if 400g of this element contains $48 \times 10^{2.3}$ atoms take $N_A = 6\times10^{23}$ Mol^{-1} 3

15. Explain with suitable examples in each case why the molar masses of some substances determined with the help of colligative properties are (i) higher (ii) lower than actual values. 3

16. (a) The standard gibbs energies ($\Delta f G^0$) of formation of SO_2 (g) and SO_3 (g) are – 300.0 and – 371.1 kJ mol^{-1} at 300K respectively
Calculate ΔG and Equilibrium constant for the following reaction at 300K.

$$2SO_2(g)+O_2(g) \rightleftharpoons 2SO_3(g)$$

(b) Explain why entropy of a perfectly crystaline substance is less than that of its imperfect crystals. 3

17. (a) How many coulombs of electric charge must be passed through a solution of silver nitrate to coat a copper sheet of area 100 cm^2 on both the sides with a 0.005 mm thick layer. Density of silver is 10.5 g cm^{-3}. Relative atomic mass of silver is 108. 2,1

(b) Three Iron sheets have been coated separately with three metals (A,B and C) whose standard electrode potentials are given below :

Metal	A	B	C	Iron
E^0 values	– .46V	–0.66V	–0.20V	0.44V

Identify in which case rusting will take place faster when coating is damaged.

18. (a) The following initial rate date were obtained at 300 K for the reactions : 2,1

$2A+B \longrightarrow C + D$

	[A] mol L^{-1}	[B] mol L^{-1}	Rate mol $L^{-1}S^{-1}$
I	0 .2	0.1	6.0×10^{-2}
II	0.4	0.1	2.4×10^{-1}
III	0.2	0.2	1.2×10^{-1}

Deduce the rate law.

(b) If half life of a reaction is inversely proportional to intital concentration of the reactant, what is the order of the reaction?

19. Gives reasons for the following : 1,1,1

(a) Enzyme catalysts are highly specific in their action.

(b) The path of light becomes visible when it is passed throught As_2O_3 sol. in water.

(c) The enthalpy in csse of chemisorption is usually higher than that of physiosorption.

20. (a) Give the IUPAC name of $[PtCl(NH_2CH_3)_2(NH_3)_2]Cl$ 1,1,1

(b) Write the name of linkage isomer of $[Co(ONO)(NH_3)S]^{2+}$

(c) Though CO is a weak lewis base yet it forms a number of stable metal carbonyls. Explain

21. (a) Complete the following nuclear reactions 1,1,

(i) $^{27}_{13}Al,(\alpha, n) \longrightarrow$

(ii) $..... \longrightarrow (\alpha, 2n)^{211}_{85}At$

(b) What is meant by K–electron capture?

(c) Which of the two type of reactions, fission or fusion is currently found useful in harnessing energy and why?

22. Give reasons

(a) Ketones are less reactive towards nucleophiles than aldehydes 1½

(b) Benzoic acid is a stronger acid than ethanoic acid. 1½

23. (a) Explain the following with the help of suitable examples 2,1

(i) coupling reduction.

(ii) Hofmann's bromamide reaction

(b) Give one chemical test to distinguish between

$CH_3CH_2NH_2$ and $C_6H_5NH_2$

OR

23. (a) Describe the following with the help of suitable examples :

(i) Clemmensen reduction

(ii) Cannizzaro's reaction

(b) Give one chemical reaction that can distinguish 2 - pentanone from 3 - pentanone (2,1)

24. Describe the following giving one example of each

(a) Vat dyes (b) Tranquilizers (c) Hybrid recoket propellants. 1,1

25. (a) Discribe the steps involved in the contact process for the manufacture of sulphuric acid.

(b) What are silcones? How are they prepared?

(c) Predict the probable structure of IBr_2 on the basis of VSEPR theory. 2,2,1

26. (a) State the probable oxidation states of the transition metals with the following configuration in their ground states: 2

(i) $3d^2$ (ii) $3d^5$ (iii) $3d^6$ (iii) $3d^7$ 1 1 1

(b) What happens when (write balanced chemical equations):

(i) Acidified potassium permangnate solution reacts with aqueous potassium iodide solution. Write the colour change taking place, if any. 3

(ii) Acidified solution of potassium dichromate reacts with aqueous solution of Sn(II) chloride. Write the colour change taking place, if any.

OR

26. (a) Name the chief ore of iron. Write the reactions involved in its extraction. 3

(b) Compare the chemistry of Actinoids and lanthanoids with special reference to 2

(i) Electronic configurations

(ii) Oxidation states

27. (a) Write two differences between vitamins and hormones. Give one example of each. 2

(b) List four biological functions of proteins. 2

(c) Name two diseases which are caused by the deficiency of enzymes. 1