COMMON PRE-BOARD EXAMINATION

CHEMISTRY-Code No. 043

Class-XII-(2025-26)

SET: 1

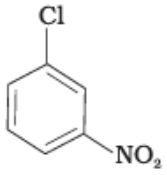
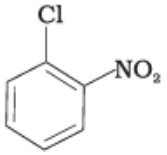
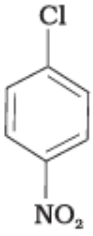
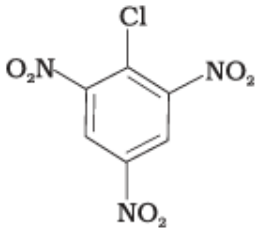
Time allowed: 3 Hrs. **Maximum Marks: 70**

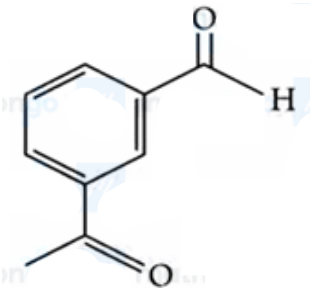
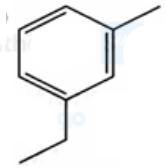
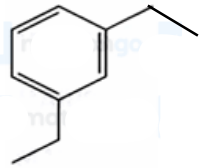
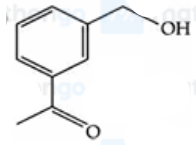
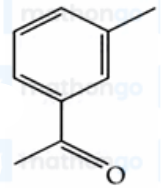
General Instructions:

Read the following instructions carefully.

1. There are 33 questions in this question paper with internal choice.
2. SECTION A consists of 16 multiple-choice questions carrying 1 mark each.
3. SECTION B consists of 5 short answer questions carrying 2 marks each.
4. SECTION C consists of 7 short answer questions carrying 3 marks each.
5. SECTION D consists of 2 case-based questions carrying 4 marks each.
6. SECTION E consists of 3 long answer questions carrying 5 marks each.
7. All questions are compulsory.
8. Use of log tables and calculators is not allowed.

Q. No.	**Section-A** Question No. 1 to 16 are multiple choice questions. Only one of the choices is correct. Select and write the correct choice as well as the answer to these questions.	Marks
1.	An azeotropic mixture of two liquids boils at a temperature lower than the boiling point of either of them when A) it is saturated B) it does not deviate from Raoults law C) it shows positive deviation from Raoults law D) it shows negative deviation from Raoults law.	1
2	The standard EMF of a cell involving one electron change is found to be 0.591 V at 25°C. The equilibrium constant of the reaction is: A) 10^5 B) 10 C) 10^{10} D) 10^{30}	1
3	Out of Ti^{3+}, Cr^{3+}, Fe^{2+} and Ni^{2+} ions, the one which is the most stable ion in aqueous solution is : A) Ti^{3+} B) Fe^{2+} C) Ni^{2+} D) Cr^{3+} [Atomic number : Ti = 22, Cr = 24, Fe = 26, Ni = 28]	1

4	The type of isomerism shown by the complex $[CoCl_2(en)_2]+$ is : A) Ionisation isomerism B) Geometrical isomerism C) Linkage isomerism D) Coordination isomerism	1
5	The products in the following reactions, respectively are P ← $AgNO_2$ CH_3-CH_2-CH_2-Br $\xrightarrow{AgCN}$ Q A) P = $CH_3-CH_2-CH_2-NO_2$, Q = $CH_3-CH_2-CH_2-CN$ B) P = $CH_3-CH_2-CH_2-ONO$, Q = $CH_3-CH_2-CH_2-NC$ C) P = $CH_3-CH_2-CH_2-ONO$, Q = $CH_3-CH_2-CH_2-CN$ D) P = $CH_3-CH_2-CH_2-NO_2$, Q = $CH_3-CH_2-CH_2-NC$	1
6	The compound which will have the lowest rate towards nucleophilic aromatic substitution on treatment with OH^- is A)  B)  C)  D) 	1
7	The reaction between phenol and chloroform in the presence of aqueous NaOH is A) nucleophilic substitution reaction B) electrophilic addition reaction C) electrophilic substitution reaction D) nucleophilic addition reaction	1
8	What happens when tertiary butyl alcohol is passed over heated copper at 300°C? A) Secondary butyl alcohol is formed B) 2-methylpropene is formed C) 1-butene is formed D) Butanol is formed	1

9	CH_3CH_2CHO and CH_3CH_2COOH can be distinguished by : A) Sodium bicarbonate test B) Hinsberg test C) Iodoform test D) Lucas test	1
10	Identify the product in the following reaction:  Zn-Hg /HCl Product A)  B)  C)  D) 	1
11	Which of the following compounds on treatment with benzene sulphonyl chloride forms an alkali-soluble precipitate ? A) CH_3CONH_2 B) $(CH_3)_3N$ C) $(CH_3)_2NH$ D) $CH_3CH_2NH_2$	1
12	Match List I with List II. Choose the correct answer from the options given below:	1

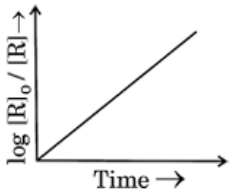
	List I		List II
A	β- D-Glucose and β- D-Galactose	I	Functional isomers
B	∝-Glucose and β- Glucose	II	Homologous
C	∝-Glucose and ∝- Fructose	III	Anomers
D	∝-Glucose and ∝-Ribose	IV	Monomers of Lactose

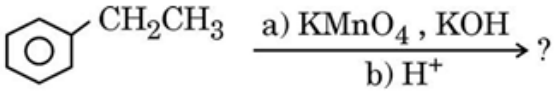
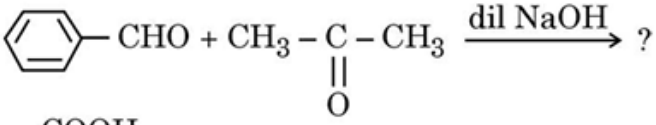
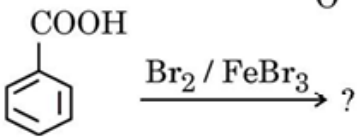
A) A-IV, B-III, C-I, D-II
B) A-III, B-IV, C-I, D-II
C) A-IV, B-III, C-II, D-I
D) A-III, B-IV, C-II, D-I

13	**Assertion (A):** All naturally occurring ∝- amino acids except glycine are optically active. **Reason (R):** Most naturally occurring amino acids have L – configuration. **Select the most appropriate answer from the options given below:** A) Both A and R are true, and R is the correct explanation of A. B) Both A and R are true, and R is not the correct explanation of A. C) A is true but R is false. D) A is false but R is true.	1
14	**Assertion (A):** Aromatic primary amines cannot be prepared by Gabriel Phthalimide synthesis. **Reason(R):** Aryl halides do not undergo nucleophilic substitution reaction with the anion formed by phthalimide. **Select the most appropriate answer from the options given below:** A) Both A and R are true, and R is the correct explanation of A. B) Both A and R are true, and R is not the correct explanation of A. C) A is true but R is false. D) A is false but R is true.	1
15	**Assertion (A):** Molar conductivity decreases with increase in concentration. **Reason(R):** When concentration approaches zero, the molar conductivity is known as limiting molar conductivity. **Select the most appropriate answer from the options given below:** A) Both A and R are true, and R is the correct explanation of A. B) Both A and R are true, and R is not the correct explanation of A. C) A is true but R is false. D) A is false but R is true.	1
16	**Assertion (A):** Addition of ethylene glycol to water lowers its freezing point. **Reason(R) :**. Ethylene glycol is insoluble in water due to lack of its ability to form hydrogen bonds with water molecules. **Select the most appropriate answer from the options given below:** A) Both A and R are true, and R is the correct explanation of A. B) Both A and R are true, and R is not the correct explanation of A. C) A is true but R is false. D) A is false but R is true.	1
	Section-B Question No. 17 to 21 are very short answer questions carrying 2 marks each.	
17	a) Which of the following species cannot act as a ligand ? Give reason. OH^-, NH_4^+ , CH_3NH_2, H_2O b) The complex $[Cr(H_2O)_6]Cl_3$ is violet in colour. Give IUPAC name of its solvate isomer which can precipitate 2 moles of silver chloride when treated with excess silver nitrate solution.	2

18	A. Define molal depression constant. How is it related to enthalpy of fusion ? **OR** B. Which aqueous solution has higher concentration - 1 molar or 1 molal solution of the same solute? Give reason. (Assume density of solvent 1g/mL)	2
19	The rate of a reaction depends upon the temperature and is quantitatively expressed as $\mathbf{k = A\ e^{-Ea/RT}}$ a) If a graph is plotted between log k and 1/T, write the expression for the slope of the curve? b) Under different conditions E_{a1} and E_{a2} are the activation energy of two reactions. If E_{a1} = 40 J / mol and E_{a2} = 80 J / mol, which of the two has a larger value of the rate constant?	2
20	Write the reaction and IUPAC name of the product formed when 2-Methylpropanal (isobutyraldehyde) is treated with ethyl magnesium bromide followed by hydrolysis.	2
21	Write the major product formed when benzene diazonium chloride is treated with a) phenol. b) ethanol.	2
	Section-C Question No. 22 to 28 are short answer questions, carrying 3 marks each.	
22	Calculate the freezing point of a solution containing 0.5g KCl dissolved in 100 g water, assuming KCl to be 92% ionized. K_f of water = 1.86 K kg/mol, Molar mass = 74.5 g/mol	3
23	a) Can we construct an electrochemical cell with two half-cells composed of $ZnSO_4$ solution and zinc electrodes? Explain your answer. b) Calculate the λ^0m for Cl- ion from the data given below: Λ^0m $MgCl_2$ = 258.6 Scm^2mol^{-1} and λ^0m Mg^{2+} = 106 Scm^2mol^{-1} c) Write the anode and cathode reactions occurring in a mercury cell.	3
24	Answer the following: a) Why are all copper(II) halides known except that copper(II) iodide? b) Why do transition elements have high enthalpies of atomisation ? c) What is the effect of pH on dichromate ion solution?	3
25	What happens when : a) Manganate ion undergoes disproportionation reaction in acidic medium ? b) $KMnO_4$ is heated ? c) $KMnO_4$ reacts with Fe^{2+} in acidic medium?	3
26	A compound is formed by the substitution of two chlorine atoms for two hydrogen atoms in propane. Write the structures of the isomers possible. Give the IUPAC name of the isomer which can exhibit enantiomerism.	3

27	a) Write the mechanism of the following reaction : $CH_2 = CH_2 + H_2O \xrightarrow{H+} CH_3CH_2OH$ b) Write the structures of the products obtained by heating  with conc. HI.	3
28	Write the reaction involved in any **three** of the following : a) Wolff-Kishner reduction b) Hell-Volhard-Zelinsky reaction c) Cannizzaro reaction d) Stephen reaction	3
	Section D Question No. 29 & 30 are case-based/data -based questions carrying 4 marks each.	
29	Coordination compounds are widely present in the minerals, plant and animal worlds and are known to play many important functions in the area of analytical chemistry, metallurgy, biological systems and medicine. Alfred Werner's theory postulated the use of two types of linkages (primary and secondary), by a metal atom/ion in a coordination compound. He predicted the geometrical shapes of a large number of coordination entities using the property of isomerism. The Valence Bond Theory (VBT) explains the formation, magnetic behaviour and geometrical shapes of coordination compounds. It, however, fails to describe the optical properties of these compounds. The Crystal Field Theory (CFT) explains the effect of different crystal fields (provided by the ligands taken as point charges) on the degeneracy of d-orbital energies of the central metal atom/ion. (i) If $PtCl_2 . 2NH_3$ does not react with $AgNO_3$, what will be its secondary valency ? 1 (ii) Draw the optical isomers of $[PtCl_2(en)_2]^{2+}$ ion. 1 (iii) A. (1) Write the formula of Iron(III)hexacyanidoferrate(II). (2) On the basis of crystal field theory write the electronic configuration for d^5 ion with a weak ligand for which $\Delta_0 < P$. 2×1=2 **OR** (iii) B. Write the hybridization and magnetic behaviour of $[Ni(CN)_4]^{2-}$ 2 [Atomic number : Ni = 28]	4
30	In a galvanic cell, chemical energy of a redox reaction is converted into electrical energy, whereas in an electrolytic cell the redox reaction occurs on passing electricity. The simplest galvanic cell is in which Zn rod is placed in a solution of $ZnSO_4$ and Cu rod is placed in a solution of $CuSO_4$.The two rods are connected by a metallic wire through a voltmeter. The two solutions are joined by a salt bridge. The difference	4

	between the two electrode potentials of the two electrodes is known as electromotive force. In the process of electrolysis, the decomposition of a substance takes place by passing an electric current. One mole of electric charge when passed through a cell will discharge half a mole of a divalent metal ion such as Cu^{2+}. This was first formulated by Faraday in the form of laws of electrolysis. (i) State Faraday's second law of electrolysis. 1 (ii) When does a galvanic cell behave like an electrolytic cell? 1 (iii) A. A steady current of 2 amperes was passed through an electrolytic cell containing electrolyte $FeSO_4$ until 2.8g of Fe deposited at the cathode of cell . How long did the current flow ? (Molar mass : Fe = 56 g mol^{-1}) 2 **OR** (iii) B. $E°_{cell}$ for the given redox reaction is 2.71 V $Mg(s) + Cu^{2+}_{(0.01\ M)} \longrightarrow Mg^{2+}_{(0.001\ M)} + Cu(s)$ Calculate E_{cell} for the reaction. 2	
	Section-E Question No. 31 to 33 are long answer type questions carrying 5 marks each.	
31	A. a) The rate of a reaction doubles when temperature changes from 27°C to 37°C. Calculate energy of activation for the reaction. ($R = 8.314\ J\ K^{-1}\ mol^{-1}$) (Given : log 2 = 0.3010, log 3 = 0.4771, log 4 = 0.6021) b) State a condition under which a bimolecular reaction is kinetically first order reaction. Give an example. For which type of reactions, do order and molecularity have the same value ? **OR** B. a) After 24 hrs, only 0.125 gm out of the initial quantity of 1 gm of a radioactive isotope remains behind. What is its half life period? (Given : log 2 = 0.3010, log 3 = 0.4771, log 5 = 0.6990) b) The reaction between A_2 (g) and B_2 (g) was carried out in a sealed isothermal container. The rate law for the reaction was found to be : Rate = $k[A_2]\ [B_2]$ If 1 mole of A_2 (g) was added to the reaction chamber and the temperature was kept constant, then predict the change in rate of the reaction and the rate constant. c) Answer the following questions on the basis of the curve given below:  (i) Predict the order of reaction. (ii) What is the slope of the curve ?	5

32	A. a) Name the branched chain component of starch. b) Ribose in RNA and deoxyribose in DNA differ in the structure around which carbon atom? c) How many peptide linkages are present in a tripeptide? d) What happens when D – glucose is treated with the following reagents (i) Bromine water (ii) HNO_3 **OR** B. a) Despite having an aldehyde group Glucose does not give 2,4 - DNP test. What does this indicate? b) Draw the Haworth structure of ∝ - D –(+) - Glucopyranose c) What is the significance of D and (+) here? d) Rupesh is suffering from fissuring at the corners of his mouth and lips. Identify the vitamin, the deficiency of which is causing his problem. Suggest two food sources to help him recover faster.	5
33	A. a) Write the major product(s) in the following reactions : (1)  (2)  (3)  b) Why is pK_b value of aniline more than that of methylamine ? c) Arrange the following in increasing order of their basic strength in aqueous solution : $CH_3 – NH_2$, $(CH_3)_2NH$, $(CH_3)_3N$ **OR** B. a) An organic compound (A) with the molecular formula $C_9H_{10}O$ forms 2,4-DNP derivative and undergoes Cannizzaro reaction. On vigorous oxidation , it gives 1,2-Benzene dicarboxylic acid. (i) Identify the compound (A) and write its IUPAC name. (ii) Write equation for the Cannizzaro reaction involved. b) How can you convert the following ? (i) Ethanoic acid to methanamine (ii) Propanenitrile to 1-aminopropane	5