Class: XII Subject: CHEMISTRY MM:70 Time:3Hrs

General Instructions:

	Read the following instructions carefully. ➢ There are **33** questions in this question paper with internal choice. ➢ SECTION A consists of 16 multiple choice questions carrying 1 mark each. ➢ SECTION B consists of 5 short answer questions carrying 2 marks each. ➢ SECTION C consists of 7 short answer questions carrying 3 marks each. ➢ SECTION D consists of 2 case - based questions carrying 4 marks each. ➢ SECTION E consists of 3 long answer questions carrying 5 marks each. ➢ All questions are compulsory. ➢ Use of log tables and calculators is not allowed.	
	SECTION : A	
1	Considering the formation, breaking and strength of hydrogen bond, predict which of the following mixtures will show a positive deviation from Raoult's law? (a) Methanol and acetone (b) Chloroform and acetone (c) Nitric acid and water (d) Phenol and aniline	1
2	What happens during the electrolysis of aqueous solution of CuSO4 by using platinum electrodes? (a) Copper will deposit at cathode. (b) Copper will deposit at anode. (c) Oxygen will be released at anode. (d) Copper will dissolve at anode	1
3	Which of the following statements is incorrect about the collision theory of chemical reaction (a) It considers reacting molecules or atoms to be hard spheres and ignores their structural features. (b) Molecules should collide with sufficient threshold energy and proper orientation for the collision to be effective. (c) Number of the effective collisions determines the rate of reaction. (d) Collision of atoms or molecules possessing sufficient threshold energy results into the product formation.	1
4	If the rate constant for a first order reaction is k, the time (t) required for the completion of 99% of the reaction is given by (a) t=0.693/k (b) t=4.606/k (c) t=2.303/k (d) t=6.909/k	1
5	Which of the following has the maximum number of unpaired electrons ? (a) Cr^{3+} (b) Co^{2+} (c) Zn^{2+} (d) Fe^{3+}	1
6	The stabilisation of coordination compounds due to chelation is called the chelate effect. Which of the following is the most stable complex species? (a) $[Fe(CN)_6]^{3-}$ (b) $[Fe(H_2O)_6]^{3+}$ (c) $[Fe(CO)_5]$ (d) $[Fe(C_2O_4)_3]^{3-}$	1
7	In the compound, lithium tetrahydrido aluminate, the ligand is : (a) H (b) H+ (c) H^- (d) None of these	1
8	Major product obtained on reaction of butene with HBr in presence of organic peroxide. (a) 1-bromobutene (b) 3-bromopropane (c) 2-bromobutane (d) 2-bromopropene	1
9	The process of converting alkyl halides into alcohols involves, which type of reaction : (a) addition (b) substitution (c) dehydrohalogenation (d) rearrangement	1
10	Which reagents are required for one step conversion of chloromethane to ethane.	1

	(a) CH_3Cl/Anhydrous $AlCl_3$ (b) CH3Cl, Na, Dry ether (c) CH_3Cl/Fe dark (d) $NaNO_2$/HCl/273-278 K	
11	Strongest acid among the following is : (a) o-methoxy phenol (b) p-methoxy phenol (c) m-methoxy phenol (d) Phenol	1
12	Given below are two statements labelled as Assertion (A) and Reason (R) A. Both A and R are true and R is the correct explanation of A B. Both A and R are true but R is not the correct explanation of A. C. A is true but R is false. D. A is false but R is true Assertion (A): Addition reaction of water to but-1-ene in acidic medium yields butan-1-ol. Reason (R): Addition of water in acidic medium proceeds through the formation of primary carbocation	1
13	Assertion (A) : Bond angle in ethers is slightly less than the tetrahedral angle. Reason (R) : There is a repulsion between two bulks (-R) groups	1
14	Which one of the following is reduced with zinc and hydrochloric acid to give the corresponding hydrocarbon ? (a) acetic acid (b) butan-2-one (c) ethyl acetate (d) acetamide	1
15	**Assertion (A):** Chlorobenzene is resistant to nucleophilic substitution reaction at room temperature. **Reason (R):** C-Cl bond gets weaker due to resonance	1
16	**Assertion (A):** Chlorobenzene is less reactive towards nucleophilic substitution reaction. **Reason (R):** Nitro group in chlorobenzene increases its reactivity towards nucleophilic substitution reaction.	1
	SECTION B	
17	If N_2 gas is bubbled through water at 298 K, how many moles of N_2 gas would dissolve in 1 litre of water ? Assume that N_2 exerts a partial pressure of 0.987 bar. Given that Henry's law constant for N_2 at 298 K is 76.48 k bar.	2
18	State the role of activated complex in a reaction and state its relation with activation energy	2
19	Give chemical tests to distinguish between the following pairs of compounds : (i) Phenol and Benzoic acid. (ii) Benzaldehyde and Acetophenone.	2
20	Define the following and give one example of each : (i) Isoelectric point, (ii) Mutarotation OR What happens when D-glucose is treated with following reagents : (i) HI (ii) Bromine water	2
21	Illustrate the following with an example of reaction in each case : (i) Sandmeyer reaction. (ii) Coupling reaction.	2
	SECTION C	
22	Predict the product of electrolysis of each of the following: (i) An aqueous solution of $AgNO_3$ using silver electrode (ii) An aqueous solution of silver nitrate using platinum electrode . (iii)Aqueous solution of H_2SO_4 using platinum electrode	3
23	The decomposition of a compound is found to follow a first order rate law. If it takes 15 minutes for 20 percent of original material to react, calculate : (i) the rate constant. (ii) the time at which 10% of the original material remains unreacted	3
24	Describe the preparation of potassium dichromate from iron chromite ore .	3
25	Give example and suggest reasons for : (i) The lowest oxide of transition metal is basic, the highest is acidic.	3

	(ii) A transition metal exhibits higher oxidation states in oxides and fluorides. (iii) The highest oxidation state is exhibited in oxoanion of a metal.	
26	(A) What happens when : (i) phenol reacts with bromine water? (ii) ethanol reacts with CH_3COCl/pyridine? (iii) anisole reacts with HI?	3
27	Define (i) chirality of molecules and racemic mixture by giving example. (ii) Haloalkanes react with KCN to form alkyl cyanides as main product while AgCN forms isocyanides as the chief product. Explain	3
28	Two isomeric compounds A and B having molecular formula $C_4H_{11}N$ both lose N_2 on treatment with HNO_2 and gives compound C and D, respectively. C is resistant to oxidation but immediately responds to Lucas reagent, whereas 'D' responds to Lucas reagent after 5 minutes and gives a positive iodoform test. Identify A and B	3
	SECTION D	
	The following questions are case -based questions. Each question has an internal choice and carries 4 (1+1+2) marks each. Read the passage carefully and answer the questions that follow	
29	Read the given passage carefully and give the answer of the following questions: Sucrose is the most widely occurring disaccharide. It is found in all photosynthetic plants. It is obtained commercially from sugarcane or sugarbeets. Its aqueous solution is dextrorotatory with specific rotation + 66.5°. On hydrolysis with dilute acids or enzyme invertase, 1 mole of sucrose gives 1 mole of D-(+)-glucose and 1 mole of (D)-(-)-fructose. Sucrose is a non-reducing sugar. It indicates that the two hexoses must have joined through a glycosidic linkage involving C-1 of a-glucose and C-2 of ß-fructose. As a result, the reducing groups of glucose and fructose are involved in the formation of glycosidic linkage and hence sucrose behaves as a non-reducing sugar. Based on above information, answer the following questions: 1. What is invert sugar? 2. What are reducing sugars? 3. What are polysaccharides ? define glycosidic bond.Give an example of each. Or Mention two functions of carbohydrates in plants.	4
30	Read the given passage carefully and give the answer of the following questions: Freezing point of a substance is the temperature at which solid and liquid phases of the substance coexist. It is defined as the temperature at which its solid and liquid phases have the same vapour pressure. The freezing point of a pure liquid is fixed. Now, if a non-volatile solute is dissolved in the pure liquid to constitute a solution, there occurs a lowering in the freezing point. The freezing point of solution refers to the temperature at which the vapour pressure of the solvent in two phases, i.e., liquid solution and solid solvent is the same. Since, the vapour pressure of solvent in solution is lowered, it becomes equal to that of the solid solvent at a lower temperature It has been observed that when a non-volatile solute is added to a solvent, the freezing point of the solution is always lower than of the pure solvent. Based on above information, answer the following questions: 1. What is an antifreeze ? 2. Give one important application of the phenomenon of depression in freezing point in every day life.. 3. A solution containing 34.2 g of cane-sugar ($C_{12}H_{22}O_{11}$) dissolved in 500 mL of water froze at – 0.374 ^oC . Calculate the freezing point depression constant of water. OR	4

	A solution of urea in water has a boiling point of 100.128°C. Calculate the freezing point of the same solution. For water Kf and Kb are 1.86°C and 0.512°C respectively.	
	SECTION E	
31	(A) Explain the chemistry of rusting of iron. (B) Calculate $\Delta G°$ and log K_C, for the following reaction: $Cd^{2+}(aq) + Zn(s) \rightarrow Zn^{2+}(aq) + Cd(s)$ {Given: E Cd^{2+}/Cd = – 0.403 V E Zn^{2+}/Zn = – 7.63 V } OR (A)One half-cell in a voltaic cell is constructed from a silver wire dipped in silver nitrate solution of unknown concentration. The other half-cell consists of a zinc electrode in a 0.10 M solution of $Zn(NO_3)_2$. A voltage of 1.48 V is measured for this cell. Use this information to calculate the concentration of silver ions in the solution. [Given: E zn^{2+}/Zn = -0.763 V, E Ag/Ag = +0.80V] (B) (i) What type of a battery is lead storage battery? (ii) Write the anode and cathode reactions when the lead storage battery is discharging/working.	
32	(A) Describe briefly the nature of bonding in metal carbonyl. (B) (i) Name two main factors that favour a metal ion forming complex. (ii) Give an example of industrial application of formation of coordination complex. (iii) Write the IUPAC $[Co(en)_2CI(ONO)]^+$. OR	5
	(A) Illustrate the geometrical isomerism with the help of an example $[Pt(NH_3)_4Cl_2]^{2+}$ (B) Answer the following: (i) Differentiate between a bidentate ligand and a monodentate ligand. (ii) Write the formula of complex tetramminecopper(ii) sulphate (iii) Draw the geometrical isomer of tetraamminedichloridocobalt(iii)chloride which is optically inactive.	
33	How will you bring about the following conversions ? (i) Butan-1-ol to butanoic acid. (ii) Benzyl alcohol to phenylethanoic acid. (iii) 3-Nitrobromobenzene to 3-nitrobenzoic acid. (iv) 4-Methyl acetophenone to benzene 1, 4-dicarboxylic acid. (v) Cyclohexene to hexane-1, 6-dioic acid.	5
	OR (a) Propanone to Propene (b) Ethanol to 3-Hydroxybutanal (c) Benzaldehyde to Benzophenone (d) Toluene to Benzaldehyde (e) Benzaldehyde to 3-Phenylpropan-1-ol	

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