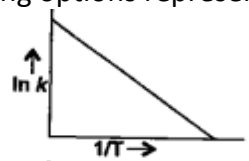
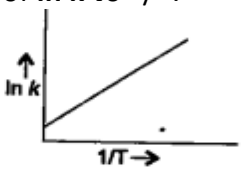
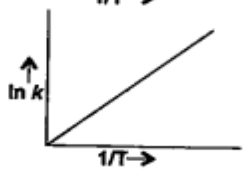
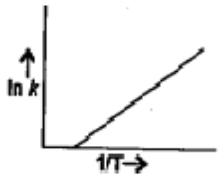
केंद्रीय विद्यालय संगठन, कोलकाता संभाग
KENDRIYA VIDYALAYA SANGATHAN, KOLKATA REGION
द्वितीय प्री बोर्ड परीक्षा / SECOND PRE-BOARD EXAMINATION 2025-26

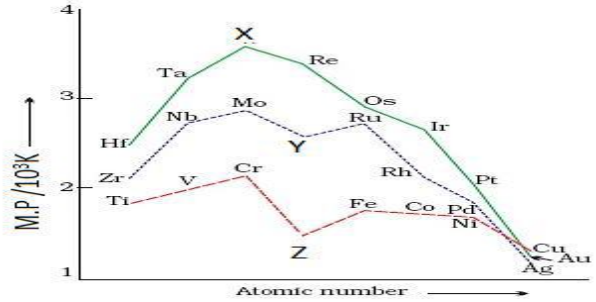
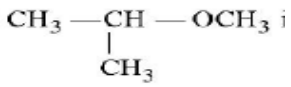
कक्षा /CLASS: बाराहवीं / XII **अधिकतम अंक /MAX. MARKS**: 70

विषय / SUB : रसायनशास्त्र / **CHEMISTRY (043)** **समय / TIME:** 03 घंटे / HOURS

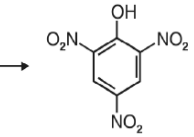
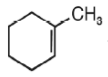
General Instructions:

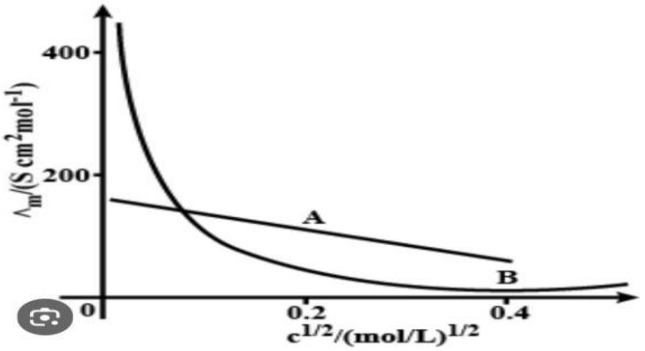
(a) There are 33 questions in this question paper with internal choice.
(b) SECTION A consists of 16 multiple -choice questions carrying 1 mark each.
(c) SECTION B consists of 5 short answer questions carrying 2 marks each.
(d) SECTION C consists of 7 short answer questions carrying 3 marks each.
(e)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

	SECTION A	
The following questions are multiple -choice questions with one correct answer. Each question carries 1 mark. There is no internal choice in this section.		
1	The cell constant of a conductivity cell _____. (a) changes with the change of electrolyte. (b) changes with the change of concentration of electrolyte. (c) changes with the change of temperature of electrolyte. (d) remains constant for a cell	1
2	According to Arrhenius equation rate constant k is equals to k= A $^{-}$ $^{/T}$. which of the following options represents the graph of **ln k vs** / . a)  (b)  c)  (d) 	1
3	The decomposition of NH_3 on platinum surface is zero order reaction. What is the rate of production of H_2 If k = 2.5×10^{-4} mol/L/s? (a) 7.5×10^{-4} mol/L/s (b) 6.5×10^{-4} mol/L/s (c) 5.7×10^{-4} mol/L/s (d)0.83×10^{-4} mol/L/s	1
4	Propanamide on Hoffmann degradation gives a) Methanamine b) Ethanamine c)Propanamine d) Ethyl cyanide	1

5	If n is the number of unpaired electrons, the magnetic moment (in BM) of transition metal ion is given by a) $\sqrt{n(n+2)}$ b) $\sqrt{2n(n+2)}$ c) $\sqrt{n(n+1)}$ d) None of these	1
6	 In the above graph the elements X, Y and Z are ----------respectively. a) Mn, Tc, W b) W, Tc, Mn c) Tc, W, Mn d) W, Th, Mn	1
7	IUPAC name of the compound  a) 1-Methoxy-1-methylethane b)2-Methoxy-2-methylethane c) 2-Methoxypropane d) Isopropyl methyl ether	1
8	Cumene (isopropylbenzene) is oxidised in the presence of air to cumene hydroperoxide. It is converted to_____by treating it with dilute acid. (a) phenol and acetone (b) Only Phenol (c) Phenol and Water (d) Only acetone	1
9	The best method for conversion of an alcohol into an alkyl halide is by treating the alcohol with a) PCl_5 b) Dry HCl in the presence of $ZnCl_2$ c)$SOCl_2$ in the presence of pyridine d) None of these	1
10	The carboxylic acid that does not undergo HVZ reaction is a) CH_3COOH b) $(CH_3)_2CHCOOH$ c) $CH_3CH_2CH_2COOH$ d) (CH3)3CCOOH	1
11	$2HCHO + NaOH \rightarrow CH_3OH + HCOONa$ The above reaction is known as: a) Wurtz reaction b) Rosenmund reaction c)Finklestein reaction d) Cannizzaro's reaction	1
12	Which of the following carbohydrate do not have a glycosidic linkage? a) Sucrose b) Amylose c) Galactose d) Maltose	1
	Q. 13 – 16 Given below are two statements labelled as Assertion (A) and Reason (R). 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 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: Phenols give o- and p-nitrophenol on nitration with conc. HNO_3 and H_2SO_4	

13	mixture. Reason: —OH group in phenol is o–, p– directing.	1
14	Assertion: Fuel cells are pollution free. Reason: Fuel cells use hydrogen like fuels along with oxygen gas for current production.	1
15	Assertion: Aldehydes are less reactive than ketone in nucleophilic addition reaction. Reason: This is due to steric and electronic reasons.	1
16	Assertion: The bond between cytosine and guanine is stronger than the bond between adenine and thymine. Reason: Cytosine and guanine have a double hydrogen bond while adenine and thymine have a triple hydrogen bond.	1
	SECTION B	
This section contains 5 questions with internal choice in one question. The following questions are very short answer type and carry 2 marks each.		
17	a) A mixture of chlorobenzene and bromobenzene forms nearly ideal solution but a mixture of chloroform and acetone does not. Why? b) Gas (A) is more soluble in water than Gas (B) at the same temperature. Which one of the two gases will have the lower value of KH (Henry's constant) and why?	1+1
18	$AgNO_3$ on reaction with NaCl in aqueous solution gives white precipitate. If the two solutions are separated by a semi-permeable membrane, will there be appearance of a white ppt. in the side 'X' due to osmosis? Give reason in support of your answer. 0.1 M $AgNO_3$ X | S P M | 0.01 M NaCl Y	2
19	Why an optically inactive product is obtained after the hydrolysis of optically active 2-Bromobutane? Identify the product and write the reaction involved.	2
20 20	a) What is the basic difference between protein present in muscles and protein present in egg? b) Write the name of the vitamin responsible for the coagulation of blood. OR a) Name the monosaccharides present in milk and cane sugar. b) What products would be formed when a nucleotide from DNA containing thymine is hydrolysed?	1+1
21	Match the columns: **Column I** / **Column II** a) Ammonolysis — p) Amine with lesser number of carbon atom b) Gabriel phthalimide synthesis — q) Detection test for primary amines. c) Hoffmann Bromamide reaction — r) Reaction of phthalimide with KOH and RX. d) Carbylamine reaction — s) Reaction of alkyl halides with NH_3.	0.5 x4

SECTION C		
This section contains 7 questions with internal choice in one question. The following questions are short answer type and carry 3 marks each		
22	Explain the following a) Sucrose is dextrorotatory, but the mixture obtained after hydrolysis is laevo rotatory. b) Amino acids behave like salts rather than simple amines or carboxylic acids. c) The presence of an aldehydic group in glucose molecule.	1x3
23	100 g of a protein is dissolved in enough water to make 10.0 L of a solution. If this solution has an osmotic pressure of 13.3 mm Hg at 25°C, what is the molar mass of protein? (R = 0.0821 L atm mol^{-1} K^{-1} and 760 mm Hg = 1 atm.	3
24	Arrange the following according to the property given: a) 1-chloropropane, isopropyl chloride, 1-chlorobutane (Increasing order of boiling point) b) Dichloromethane, chloroform, carbon tetrachloride. (Increasing order of dipole moment) c) 1-Bromobutane, 1-Bromo-2,2-Dimethylpropane, 1-Bromo-2-methylbutane, 1-Bromo-3-methylbutane (Increasing order of reactivity towards SN2 reaction)	3
25	a) Identify A and B in each of the following processes $C_6H_5NH_2 \xrightarrow{NaNO_2/HCl} A \xrightarrow[OH^-]{C_6H_5NH_2} B$ b) Arrange the following compounds in the order of pk_b values: $C_2H_5NH_2$, $C_6H_5NHCH_3$, $(C_2H_5)_2NH$ and $C_6H_5NH_2$. (in vapour phase) C) Draw the structure of N-Methylethanamine.	3
26	Calculate the cell potential, E_{cell}, at 25 °C for the cell if the initial concentration of Ni $(NO_3)_2$ is 0.100 molar and the initial concentration of $AgNO_3$ is 1.00 molar. [E^0 Ni2+/Ni = -0.25 V; E^0Ag+/Ag = 0.80 V; log 10^{-1} = -1]	3
27	A metal complex having composition Cr $(NH_3)_4$ Cl_2Br has been isolated in two forms 'A' and 'B'. The form 'A' reacts with $AgNO_3$ solution to give white precipitate which is readily soluble in dilute aqueous ammonia, whereas 'B' gives a pale-yellow precipitate which is soluble in concentrated ammonia solution. Write the formula of 'A' and 'B'. Also mention the isomerism which arises among 'A' and 'B'.	3
	OR	
27	The coordination no. of Ni^{2+} is 4. NiCl2 + KCN (excess) → A (a cyano complex) A + Conc HCl(excess) → B (a chloro complex) a) Write IUPAC name of A. b) Predict the magnetic nature of A and B c) Write hybridization of Ni in A and B.	
28	Identify the missing reactant or product A to D in the following equations: (i) (A) + HNO_3 + H_2SO_4 →  (ii)  + dil. H_2SO_4 → (B) iii) $CH_3OC_6H_5$ + HI → C + D	1x3
SECTION D		

29	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.  **Answer the following questions on the basis of above graph:** a) Based on graph predict the strong or weak nature of 'A' and 'B' as an electrolyte. b) Does the concept of infinite dilution applicable for electrolyte 'A'? Give reason. c) Based on the curve write the mathematical relation between ʌm and concentration for 'A'. What does the slope and intercept indicate? OR c) Can we calculate the value of limiting molar conductivity of electrolyte 'A' and 'B' by analysing the given graph? Give reason for your answer**.**	
30	**Read the passage given below and answer the following questions:** Crystal Field Theory was developed to describe important properties of complexes (magnetism, absorption spectra, oxidation states, coordination,). The basis of the model is the interaction of d-orbitals of a central atom with ligands, which are considered as point charges. According to CFT, *the attraction between the central metal and ligands in a complex is purely electrostatic.* The theory is developed by considering energy changes of the five-degenerate d- orbitals being surrounded by an array of point charges consisting of the ligands. As a ligand approaches the metal ion, the electrons from the ligand will be closer to some of the d-orbitals and farther away from others, causing a loss of degeneracy. The electrons in the d-orbitals and those in the ligand repel each other due to repulsion between like charges. Thus, the d-electrons closer to the ligands will have a higher energy than those further away, which results in the d-orbitals splitting in energy in t_2g and eg set. The splitting of d orbitals takes place differently in different geometries, such as octahedral, tetrahedral, and square planar complexes, due to the varying orientations of ligands relative to the d orbitals. a) A metal ion M^+ having d^4 valence electronic configuration combines with three didentate ligands to form complexes. Assuming Δo > P, write the electronic configuration of the valence electrons of the metal M^+ ion in terms of t_2g and eg. b) What type of the hybridization will M^+ ion have? c) Name the type of isomerism and draw the structure of the isomers exhibited by this complex. OR d) Draw the diagram showing d orbital splitting during this complex formation.	

SECTION E

The following questions are long answer type and carry 5 marks each. All questions have an internal choice

31 a) Give reason 1x5

i) Transition metals have high melting points.

ii) The highest oxidation state of a transition metal exhibited in its oxide or fluoride only.

b) What is meant by 'lanthanoid contraction'?

c) Complete the following chemical equations:

(i) $MnO_4^-(aq) + S_2O_3^{2-}(aq) + H_2O(l) \rightarrow$

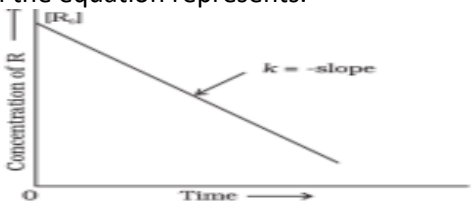
(ii) $Cr_2O_7^{2-}(aq) + Fe^{2+}(aq) + H^+(aq) \rightarrow$

OR

31 When a chromite ore (A) is fused with sodium carbonate in free excess of air and the product is dissolved in water, a yellow solution of compound (B) is obtained. After treatment of this yellow solution with sulphuric acid, compound (C) can be crystallized from the solution. When compound (C) is treated with KCl, orange crystals of compound (D) crystallise out. Identify A to D and also explain the reactions. 5

32 a) The rate of a reaction triples when the temperature changes from 298 K to 318 K. Calculate the energy of activation of the reaction assuming that it does not change with temperature. (Given R = 8.314 $JK^{-1}mol^{-1}$, log 3 = 0.4771).

b) Identify the order of reaction and write its integrated rate equation mentioning what each term in the equation represents.



OR

a) A reaction is of first order in reactant A and of second order in reactant B. How is the rate of this reaction affected when the concentrations of A as well as B are doubled?

b) Distinguish between 'rate expression' and 'rate constant' of a reaction.

c) The following data were obtained during the first order thermal decomposition of SO_2Cl_2 at constant volume. Calculate the rate constant.

$$SO_2Cl_2(g) \rightarrow SO_2(g) + Cl_2(g)$$

Experiment	Time(sec)	Total pressure(atm.)
1	0	0.4
2	100	0.7

33 Attempt **any five** of the following:

a) Convert benzoic acid to benzaldehyde.

b) Give a simple test to distinguish between phenol and benzoic acid.

c) Why benzoic acid does not undergo Friedel Craft reaction?

d) Identify the product obtained when sodium benzoate is distilled with sodalime.

e) Arrange the following in increasing order of acidic strength:

CH_3COOH, FCH_2COOH, $ClCH_2COOH$

f) Ethanal + aq. $Ba(OH)_2$ $\longrightarrow$

g) $CH_3-\underset{\underset{O}{\|}}{C}-Cl + H_2 \xrightarrow[\text{Boiling xylene}]{\text{Pd } BaSO_4, S}$