

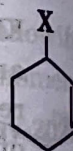
Time : 1 Hour]

PART - A

[Total Marks : 50

- Select the following questions with proper alternative and answer it :
- Which of the following cell is different in terms of principle ?
 (A) Storage cell (B) Electrolytic cell
 (C) Fuel cell (D) Leclanche cell
 - Standard electrode potential of three metals x, y and z are -1.2 V , $+0.5\text{ V}$ and -3.0 V . The order of reducing agent of three metals are...
 (A) $y > z > x$ (B) $y > x > z$
 (C) $z > x > y$ (D) $x > y > z$
 - KH value for $\text{Ar}_{(g)}$, $\text{CO}_{2(g)}$, $\text{HCHO}_{(g)}$ and $\text{CH}_{4(g)}$ are 40.39, 1.67, 1.83×10^{-5} and 0.413 respectively. Arrange these gases in the order of their increasing solubility.
 (A) $\text{HCHO} < \text{CH}_4 < \text{CO}_2 < \text{Ar}$
 (B) $\text{HCHO} < \text{CO}_2 < \text{CH}_4 < \text{Ar}$
 (C) $\text{Ar} < \text{CO}_2 < \text{CH}_4 < \text{HCHO}$
 (D) $\text{Ar} < \text{CH}_4 < \text{CO}_2 < \text{HCHO}$
 - The relative lowering of the vapour pressure of an aqueous solution containing a non-volatile solute is 0.0125. The molality of the solution is
 (A) 0.70 (B) 0.50 (C) 0.60 (D) 0.80
 - What will be the molality of 10 % w/w aqueous solution of NaOH ? (Mol. mass of NaOH = 40 g/mol^{-1}) [March-2022]
 (A) 2.78 m (B) 2.5 m (C) 2.87 m (D) 2.05 m
 - What will be the boiling point of 1 m urea solution in Kelvin ? ($K_b = 0.52\text{ K kg mol}^{-1}$) [March-2022]
 (A) 373.67 (B) 100.52 (C) 378.35 (D) 105.2
 - Which mixture shows positive deviation from Raoult's law ? [March-2022]
 (A) Ethanol + Acetone
 (B) Phenol + Aniline
 (C) Chloroform + Acetone
 (D) Nitric acid + Water
 - Under identical conditions, which solution has highest osmotic pressure ? [March-2022]
 (A) 1 M NaCl (B) 1M BaCl_2
 (C) 1M FeCl_3 (D) 1M Glucose
 - What is the potential of hydrogen electrode in contact with a solution whose pH is equal to 1 ? [March-2022]
 (A) 0.059 V (B) 0.59 V (C) 0.0059 V (D) 5.9 V
 - How much electricity in terms of Faraday is required to reduce 2 mol of MnO_4^- to Mn^{2+} ? [March-2022]
 (A) 5 (B) 10 (C) 3 (D) 6
 - On which of the following factors, electronic conductance does not depend ? [March-2022]
 (A) The nature and structure of metal.
 (B) The number of valance electrons per atom.
 (C) Temperature (D) Pressure
 - What is the unit of rate constant of the second order reaction ? [March-2022]
 (A) $\text{Mol L}^{-1} \text{s}^{-1}$ (B) $\text{Mol}^{-1} \text{L S}^{-1}$
 (C) S^{-1} (D) $\text{Mol}^{-2} \text{L}^2 \text{S}^{-1}$
 - What is the slope of graph of $\ln k \rightarrow \frac{1}{T}$? [March-2022]
 (A) $-\frac{E_a}{R}$ (B) $-\frac{2.303E_a}{R}$
 (C) $-\frac{R}{E_a}$ (D) $-\frac{2.303R}{E_a}$
 - Resultant solution of electrolysis of concentrated NaCl solution is....
 (A) Do not change colour of red or blue litmus paper.
 (B) It converts blue litmus to red.
 (C) It remains colourless with phenolphthaleine.
 (D) It converts red litmus to blue.
 - In any reaction rate of reactant is double when concentration of reactant is increase in 4 times. If concentration of reactant is increase in 9 times than calculate rate of reactant.
 (A) 9 times (B) 27 times
 (C) 3 times (D) 4 times

- 16) The rate of a first-order reaction is $0.04 \text{ mol L}^{-1} \text{ s}^{-1}$ at 10 seconds and $0.03 \text{ mol L}^{-1} \text{ s}^{-1}$ at 20 seconds after initiation of the reaction. The half life period of the reaction is....
(A) 34.1 s (B) 44.1 s (C) 54.1 s (D) 24.1 s
- 17) With the help of which graph the value of Arrhenius constant can be obtained from Arrhenius equation : $K = A \cdot e^{-E_a/RT}$
(A) $\log K$ versus $\frac{1}{\log T}$ (B) K versus $\frac{1}{\log T}$
(C) $\log K$ versus $\frac{1}{T}$ (D) K versus T
- 18) What is the number of ions separated from aqueous solution of $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$?
(A) 6 (B) 4 (C) 3 (D) 2
- 19) IUPAC name of $\text{K}_2[\text{Ni}(\text{CN})_4]$ complex....
(A) Potassium tetracyano nickelate(II)
(B) Potassium tetracyano nickelate(III)
(C) Potassium tetracyano nickel(II)
(D) Potassium tetracyano nickel(III)
- 20) How many alcohols with a molecular formula $\text{C}_4\text{H}_{10}\text{O}$ are chiral in nature ?
(A) 1 (B) 2 (C) 3 (D) 4
- 21) Reduction of ethyl benzoate by LiAlH_4 gives...
(A) Phenyl Ethanol + Methanol
(B) Phenyl Ethanol + Ethanol
(C) Phenyl Methanol + Ethanol
(D) Phenyl Methanol + Methanol
- 22) IUPAC name of pthalaldehyde is....
(A) Cyclohexane-1, 2-dicarbaldehyde
(B) Benzene-1, 2-dicarbaldehyde
(C) Benzene-1 2-methenal
(D) Benzene-1, 2-dienal
- 23) Which ionic pair from the following is coloured in aqueous solution ?
(A) Sc^{3+} , Ti (B) Sc^{3+} , Co^{2+}
(C) Ni^{2+} , Cu^+ (D) Ni^{2+} , Ti^{3+}
- 24) Which of the following compound has the highest magnetic moment ? [March-2022]
(A) MnSO_4 (B) $\text{Ni}(\text{NO}_3)_2$
(C) CrCl_3 (D) FeSO_4
- 25) Which is transition element ? [March-2022]
(A) Zn (B) Cd (C) Hg (D) Cu
- 26) Colour of K_2MnO_4 is [March-2022]
(A) violet (B) green (C) blue (D) red
- 27) What is the primary and secondary valency of the metal in a complex $[\text{Co}(\text{C}_2\text{O}_4)_2(\text{H}_2\text{O})_2]^{-1}$ [March-2022]
(A) 2 and 4 (B) 3 and 4 (C) 3 and 6 (D) 1 and 6
- 28) $[\text{PtCl}_2(\text{en})_2]$ possess which type of isomerism ? [March-2022]
(A) Ionization (B) Geometrical (C) Optical
(D) Geometrical and optical both
- 29) Which is correct relation for high spin complex ? [March-2022]
(A) $\Delta_0 < P$ (B) $\Delta_0 > P$ (C) $\Delta_0 = P$ (D) $\Delta_0 \geq P$
- 30) Which kind of halide is the following compound ? [March-2022]
(A) Arylhalide (B) Vinylic
(C) Benzyl (D) Allylic
- 31) Which of the following is the Wurtz-fittig reaction ? [March-2022]
(A) $\text{C}_2\text{H}_5\text{Cl} + \text{C}_2\text{H}_5\text{Cl} \xrightarrow{\text{Na in dry ether}}$
(B) $\text{C}_2\text{H}_5\text{Cl} + \text{C}_6\text{H}_5\text{Cl} \xrightarrow{\text{Na in dry ether}}$
(C) $\text{C}_6\text{H}_5\text{Cl} + \text{C}_6\text{H}_5\text{Cl} \xrightarrow{\text{Na in dry ether}}$
(D) $\text{C}_2\text{H}_5\text{Cl} + \text{C}_3\text{H}_7\text{Cl} \xrightarrow{\text{Na in dry ether}}$
- 32) How many chiral carbons are in pentan-2, 3, 4-triol ? [March-2022]
(A) 3 (B) 4 (C) 1 (D) 2
- 33) How many sigma and pi-bonds are present in DDT ? [March-2022]
(A) 29, 6 (B) 27, 6 (C) 28, 5 (D) 27, 5
- 34) Reduction of which compound gives 2° alcohol ? [March-2022]
(A) Acetaldehyde (B) Acetic acid
(C) Acetone (D) Ethyl acetate
- 35) Which product is obtained by oxidation of phenol with chromic acid ? [March-2022]
(A) Benzene (B) Benzoic acid
(C) Benzoquinone (D) Acetophenone

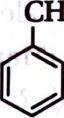
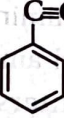
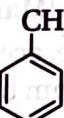
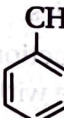


36) Under identical condition, which of the following has highest boiling point ? [March-2022]

- (A) Propan-1-ol (B) Butan-1-ol
(C) 2-Methylpropan-2-ol (D) Butan-2-ol

37) Correct structure of cinnamaldehyde is

[March-2022]

- (A)  (B) 
(C)  (D) 

38) Which has lowest pK_a ? [March-2022]

- (A) CH_3COOH (B) C_6H_5COOH
(C) $C_6H_5CH_2COOH$ (D) CH_3CH_2COOH

39) Which of the following gives propanamine product by Hofmann bromamide reaction ?

[March-2022]

- (A) $HCONH_2$ (B) CH_3CONH_2
(C) $CH_3CH_2CONH_2$ (D) $CH_3CH_2CH_2CONH_2$

40) Hinsberg's reagent reacts with which amine ?

[March-2022]

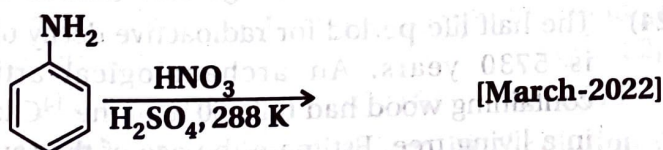
- (A) CH_3NH_2 (B) $(CH_3)_2NH$
(C) $(CH_3)_3N$ (D) (A) and (B) both

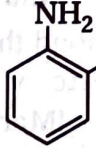
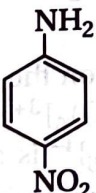
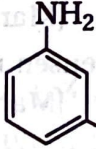
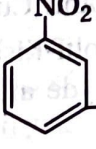
41) Which reagent is used in Gattermann reaction ?

[March-2022]

- (A) Cu/HX (B) Cu_2X_2/HX
(C) $CHCl_3 + NaOH$ (D) $Zn-Hg/HCl$

42) What is the major product of the reaction ?



- (A)  (B) 
(C)  (D) 

43) Which of the following is not a polysaccharide ?

[March-2022]

- (A) Starch (B) Cellulose
(C) Glycogen (D) Sucrose

44) What is chemical name of vitamin B_6 ?

[March-2022]

- (A) Thiamine (B) Riboflavin
(C) Pyridoxine (D) Ascorbic acid

45) Which is bicyclic base ? [March-2022]

- (A) A (B) C (C) T (D) U

46) Which protein is present in muscles ?

[March-2022]

- (A) Keratin (B) Myosin
(C) Insulin (D) Albumin

47) Which of the following compound will give Aldol condensation reaction ?

- (A) Trichloro acetaldehyde
(B) Acetaldehyde
(C) Formaldehyde
(D) Trimethyl acetaldehyde

48) Which of the following reaction is done on oxidation of acetaldehyde to form methane as product ?

- (A) Tollen's reaction
(B) Aldol condensation
(C) Reduction with $LiAlH_4$
(D) Decarboxylation with sodalime

49) Reaction between benzaldehyde and acetophenone in presence of dilute NaOH is known as....

- (A) Cross cannizzaro's reaction
(B) Cross aldol condensation
(C) Aldol condensation
(D) Cannizzaro's reaction

50) How many isomers of amine compounds are possible for molecular formula $C_4H_{11}N$?

- (A) 8 (B) 7 (C) 4 (D) 2

Time : 2 Hours**PART - B****[Total Marks : 50]****Section - A**

- ◆ Write the answer of any 8 questions from given question number 1 to 12. (Each of 2 marks) [16]
- Predict the number of unpaired electrons in the square planar $[\text{Pt}(\text{CN})_4]^{2-}$ ion. [March-2022]
 - A solution of $\text{Ni}(\text{NO}_3)_2$ is electrolysed between platinum electrodes using a current of 5 amperes for 20 minutes. What mass of Ni is deposited at the cathode ? (Atomic mass of Ni = 58.7 u) [March-2022]
 - State two differences between molecularity and order of reaction. [March-2022]
 - Explain giving reasons : (i) The transition metals generally form coloured compounds. (ii) Which acid is used to titrating the KMnO_4 and $\text{K}_2\text{Cr}_2\text{O}_7$?
 - Use Hund's rule to derive the electronic configuration of Ce^{3+} ion, and calculate its magnetic moment on the basis of 'spin-only' formula.
 - Draw the isomers of $[\text{Co}(\text{NH}_3)_3(\text{NO}_2)_3]$ complex. [March-2022]
 - Give conversion : Benzene into diphenyl. [March-2022]
 - State the various uses and side effect of Dichloromethane (Methylene chloride) CH_2Cl_2 .
 - State the reactions which prove the presences of $-\text{C}-$ and primary $-\text{OH}$ group in glucose. [March-2022]
 - Give only reaction to prepare glucose from sugar and starch.
 - Give the Zinc dust of phenol and oxidation of reactions.
 - Give the conversions :
Benzaldehyde to Benzophenone

Section - B

- ◆ Write the answer of any 6 questions from given question number 13 to 21. (Each of 3 marks) [18]
- If N_2 gas is bubbled through water at 293 K, how many millimoles 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 293 K is 76.48 K bar.
 - Derive equation of rate constant and half reaction

- time for zeroth order reaction. [March-2022]
- The electrical resistance of a column of 0.05 mol L^{-1} NaOH solution of diameter 1 cm and length 50 cm is 5.55×10^3 ohm. Calculate its resistivity, conductivity and molar conductivity.
- Explain β -elimination reaction of haloalkane. [March-2022]
- Write carbyl amine test. [March-2022]
- What is interstitial compound ? Write its characteristics. [March-2022]
- Write the reactions of formaldehyde, acetaldehyde and acetone with methyl magnesium bromide. [March-2022]
- Complete the reactions : [March-2022]
 - $\text{C}_6\text{H}_5\text{COOH} + \text{SOCl}_2 \rightarrow$
 - $\text{CH}_3\text{COOH} \xrightarrow[\text{(ii) H}_2\text{O}]{\text{(i) X}_2/\text{Red P}}$
 - $\text{CH}_3\text{CH}_2\text{COOH} + \text{NH}_3 \xrightarrow{\Delta}$
- Give conversion in three steps : Nitrobenzene into chlorobenzene [March-2022]

Section - C

- ◆ Write the answer of any 4 questions from given question number 22 to 27. (Each of 4 marks) [16]
- 0.6 mL of CH_3COOH having density 1.06 g mL^{-1} is dissolved in 1 litre of water. The depression in freezing point observed for this strength of acid was 0.0205 $^\circ\text{C}$. Calculate the Van't Hoff factor and the dissociation constant of acid. [March-2022]

$(K_f = 1.86 \text{ K kg mol}^{-1} \text{ and molecular mass of } \text{CH}_3\text{COOH} = 60 \text{ g mol}^{-1})$
 - Write reactions occurring at anode and cathode in dry cell and lead storage cell. [March-2022]
 - The half life period for radioactive decay of ^{14}C is 5730 years. An archaeological artifact containing wood had only 60 % of the ^{14}C found in a living tree. Estimate the age of the sample. [March-2022]
 - Explain on the basis of valence bond theory that $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ is paramagnetic where as $[\text{Fe}(\text{CN})_6]^{4-}$ is diamagnetic. [March-2022]
 - Write the reactions to prepared phenol from Aniline and Cumine. [March-2022]
 - Write Wolff-Kishner and Clemmensen reduction of aldehyde and ketone. [March-2022]