



(English Version)

- Instructions :**
1. Question paper has FIVE parts. All parts are compulsory.
 2. a) Part-A carries 20 marks. Each question carries 1 mark.
b) Part-B carries 06 marks. Each question carries 2 marks.
c) Part-C carries 15 marks. Each question carries 3 marks.
d) Part-D carries 20 marks. Each question carries 5 marks.
e) Part-E carries 09 marks. Each question carries 3 marks.
 3. For Part-A questions, only the first written answers will be considered for evaluation.
 4. Write balanced chemical equations and draw neat labelled diagrams and graphs wherever necessary.
 5. Direct answers to the numerical problems without detailed step and specific unit for final answer will not carry any marks.
 6. Use log tables and simple calculator if necessary. (Use of scientific calculator is not allowed)

PART – A

- I. Select the correct option from the given choices : (15 × 1 = 15)
- 1) If the process of dissolution of a solid in liquid is an endothermic, its solubility ;
 - a) decrease with increase in temperature
 - b) remains same at all temperature
 - c) increase with increase in temperature
 - d) increase with decrease in temperature



- 2) When the concentration of electrolytic solution approaches zero, the resulting molar conductivity is known as ;
- a) specific conductance
 - b) resistivity
 - c) conductivity
 - d) limiting molar conductivity
- 3) During discharging of lead storage battery the correct half-cell reaction is ;
- a) At anode, Pb is converted into PbO_2
 - b) At anode, Pb is converted into PbSO_4
 - c) At anode, PbO_2 is converted into PbSO_4
 - d) At cathode, Pb is converted into PbSO_4
- 4) The catalyst in a chemical reaction provides an alternate pathway or reaction mechanism by decreasing ;
- a) Activation energy
 - b) Kinetic energy
 - c) Normal energy of reacting species
 - d) Potential energy
- 5) Which of the following pair of metal oxides are amphoteric?
- a) V_2O_5 , Cr_2O_3
 - b) Mn_2O_7 , CrO_3
 - c) V_2O_5 , V_2O_4
 - d) CrO , V_2O_5
- 6) The correct IUPAC name of $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$ is ;
- a) Diamminedichloridoplatinum (II)
 - b) Dichloridodiammineplatinum (0)
 - c) Dichloridodiammineplatinate (II)
 - d) Diamminedichloridoplatinate (0)
- 7) The stereoisomers related to each other as non-superimposable mirror images are called ;
- a) Enantiomers
 - b) Diastereomers
 - c) Anomers
 - d) Racemic mixture



- 8) Anisole on treatment with CH_3Cl in the presence of anhydrous AlCl_3 gives ;
- Toluene
 - O – chloroanisole
 - Ortho and para-methylanisoles
 - p – chloroanisole
- 9) The enzyme which can catalyse the conversion of glucose to ethanol is ;
- Invertase
 - Maltase
 - Zymase
 - Sucrase
- 10) Nucleophilic attack on carbonyl carbon atom changes its hybridization from ;
- sp to sp^2
 - sp^2 to sp^3
 - sp^3 to sp^2
 - sp to sp^3
- 11) Decarboxylating reagent is a mixture of ;
- Alc. $\text{KOH} + \text{H}_2\text{O}_2$
 - $\text{NaOH} + \text{CO}_2$
 - $\text{NaOH} + \text{CaO}$
 - Conc. $\text{HCl} + \text{ZnCl}_2$
- 12) To prepare p-Nitroaniline as a major product from aniline, the amino group is protected by ;
- Acetylation
 - Alkylation
 - Saponification
 - Sulphonation
- 13) The reagents used to separate the mixture of methylamine and dimethylamine are ;
- CHCl_3 and HCl
 - $\text{C}_6\text{H}_5\text{SO}_2\text{Cl}$ and KOH
 - $\text{C}_6\text{H}_5\text{SO}_2\text{Cl}$ and HCl
 - CHCl_3 and KOH
- 14) The carbohydrate which is also known as animal starch and stored in animal body is ;
- Starch
 - Sucrose
 - Glycogen
 - Cellulose
- 15) Which vitamin deficiency causes the disease cheilosis?
- Vitamin B_1
 - Vitamin B_2
 - Vitamin B_6
 - Vitamin B_{12}



- II. Fill in the blanks by choosing the appropriate word from those given in the brackets : (5 × 1 = 5)

[ionic charge, Grignard reagent, $\text{C}_6\text{H}_5\text{N}_2^+ \text{Cl}^-$, Collision frequency, Molality, Molarity]

- 16) The number of moles of solute present in one kilogram of the solvent is called _____.
- 17) The number of collisions per second per unit volume of the reaction mixture is known as _____.
- 18) Transition metals form large number of complex compounds due to high _____.
- 19) The common name of alkyl magnesium halide is _____.
- 20) The formula of benzenediazonium chloride is _____.

PART – B

- III. Answer **any three** of the following. Each question carries 2 marks : (3 × 2 = 6)

- 21) What type of deviation from Raoult's law is observed, when equal volume of ethanol and acetone are mixed together? Mention the reason for it. (2)
- 22) Mention any two differences between order and molecularity of a reaction. (2)
- 23) a) What is spectrochemical series? (1)
b) Between $[\text{Co}(\text{en})_3]^{3+}$ and $[\text{Co}(\text{NH}_3)_6]^{3+}$ complex ions which is more stable? (1)
- 24) Write the IUPAC name of product obtained when ethylbromide reacts with sodium iodide in dry acetone. Name the reaction. (2)
- 25) Explain Haloform reaction with chemical equation. (2)
- 26) Name two hormones which regulate the glucose level in the blood. (2)



PART – C

IV. Answer **any three** of the following. Each question carries **3** marks : $(3 \times 3 = 9)$

- 27) Write the balanced chemical equations in the manufacture of potassium dichromate from chromite ore. (3)
- 28) a) Give a reason for each of the following :
- i) The spin only magnetic moment of Sc^{3+} is zero. (1)
 - ii) Alloys are readily formed by transition metals. (1)
- b) Write the structure of manganate ion (MnO_4^{2-}). (1)
- 29) What is Lanthanoid Contraction? Mention two consequences of it. (3)
- 30) a) Draw the geometrical isomers of $[\text{CoCl}_2(\text{en})_2]$. (2)
- b) Give an example for ambidentate ligand. (1)
- 31) On the basis of Valence Bond Theory [VBT], explain geometry, hybridisation and magnetic property of $[\text{Co}(\text{NH}_3)_6]^{3+}$ ion. [Atomic number of cobalt is 27] (3)
- 32) a) Draw the energy level diagram for the splitting of d-orbitals in an octahedral crystal field. (2)
- b) If $\Delta_0 < P$, on the basis of crystal field theory [CFT]. Write the electronic configuration of d^4 -ion in octahedral complexes. (1)

V. Answer **any two** of the following. Each question carries **3** marks : $(2 \times 3 = 6)$

- 33) a) What is reverse osmosis? Mention one of its application. (2)
- b) State Henry's Law. (1)
- 34) Draw a neat labelled diagram of Standard Hydrogen Electrode (SHE). Write its half-cell reaction. (3)
- 35) Write the anodic, cathodic and overall reactions of corrosion of iron occurs in the presence of water and air. (3)
- 36) Derive Integrated rate equation for rate constant of a zero order reaction. (3)

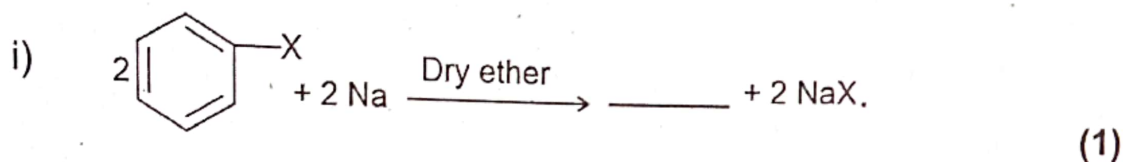


PART – D

VI. Answer **any four** of the following. Each question carries **5** marks : $(4 \times 5 = 20)$

37) a) Write the mechanism for the conversion of methylchloride to methylalcohol. Mention the order. (3)

b) Complete the following equation :

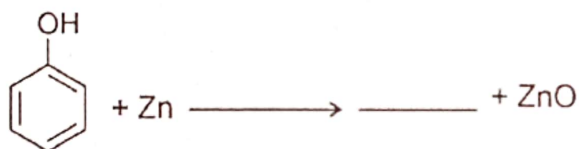


38) a) Write the steps involved in the mechanism of acid catalysed dehydration of ethanol to ethene. (3)

b) What is Lucas reagent? Which class of alcohols does not produce turbidity with it at room temperature? (2)

39) a) Write the chemical equations in the manufacture of phenol by cumene process. (2)

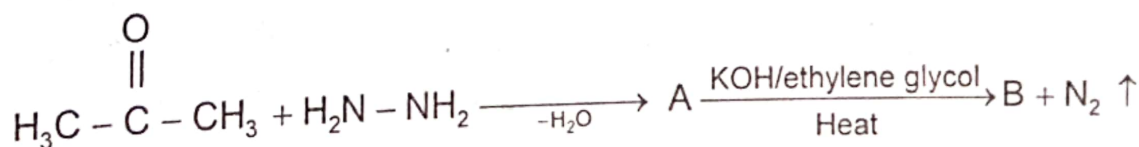
b) Complete the equation. (1)



c) Explain Williamson's reaction for the preparation of methoxymethane. (2)

40) a) How does methanal reacts with hydroxylamine? Explain with equation. (2)

b) Identify A and B in the following reaction. (2)



c) Write any one reagent used to distinguish between aldehyde and ketone. (1)



- 41) a) When methyl magnesium iodide reacts with dry ice forms an intermediate, which on acidification gives compound 'A'.
i) Write the equation for the above chemical reaction. (2)
ii) Write the IUPAC name of compound 'A'. (1)
- b) Between acetic acid and monochloroacetic acid, which is more acidic? Give reason. (2)
- 42) a) Write the chemical equations involved in the Gabriel phthalimide synthesis of methanamine. (3)
- b) Explain the coupling reaction of benzenediazonium chloride with phenol using chemical equation. (2)
- 43) a) Write the Haworth structure of sucrose. (2)
- b) i) What are essential amino acids? (1)
ii) Give an example for fibrous proteins. (1)
- c) Name the nitrogenous base present in DNA but not in RNA. (1)

PART – E

(PROBLEMS)

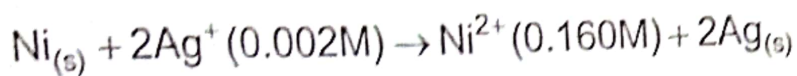
VII. Answer **any three** of the following. Each question carries **3** marks : ($3 \times 3 = 9$)

- 44) Calculate the mole fraction of benzene in solution containing 30% by mass in carbon tetrachloride.

[Given Molar mass of Benzene = 78 g/mol, Molar mass of carbon tetrachloride = 154 g/mol]

- 45) 1.00 g of a non-electrolyte solute dissolved in 50 g of benzene lowered the freezing point of benzene by 0.40 K. The freezing point depression constant of benzene is $5.12 \text{ K kg mol}^{-1}$. Find the molar mass of the solute.

46) Calculate the emf of the cell in which the following reaction takes place :



Given that $E_{\text{cell}}^{\circ} = 1.05 \text{ V}$ at 298 K.

47) A solution of CuSO_4 is electrolysed for 10 minutes with a current of 1.5 amperes. What is the mass of copper deposited at the cathode?

[Molar mass of copper = 63 g/mol. $1F = 96487\text{C}$]

48) A first order reaction has a rate constant $1.15 \times 10^{-3} \text{ s}^{-1}$. How long will 5 g of this reactant take to reduce to 3 g?

49) The rate of a reaction quadruples when the temperature changes from 293 K to 313 K. Calculate the E_a of the reaction assuming that it does not change with temperature.
