Academic Session 2014-15
Pre Board Examination
Subject – CHEMISTRY(THEORY)
M/2/2

Roll No. ---------- **Code : M/2/2**

- Please check that this question paper contains **5** printed pages
- Code number given on the right hand side of the question paper should be written on the title page of the answer book by the candidate.
- Please check that this question paper contains **26** questions.
- Please write down the Serial Number of the question before attempting it.
- 15 minutes time has been allotted to read this question paper.

Time : 3 hrs *Max. Marks – 70*

General Instructions:

(i) All questions are compulsory.
(ii) Questions nos. 1 to 5 are very short answer questions and carry 1 mark each.
(iii) Questions nos. 6 to 10 are short answer questions and carry 2 marks each.
(iv) Questions nos. 11 to 22 are short answer questions and carry 3 marks each.
(v) Question no. 23 is a Value Based Question and carries 4 marks.
(vi) Question nos. 24 to 26 are long answer questions and carry 5 marks each.
(vii) Use Log Tables, if necessary. Use of calculators is **not** permitted.

1 PCl_5 acts as an oxidizing agent. Justify 1

2 How does the adsorption of N_2 on charcoal vary with temperature at constant pressure. 1

3 What monomers are joined together in Glycosidic linkage. 1

4 Why do some glass objects from ancient civilization found to become milky? 1

5 Write IUPAC name of the following: 1
$Br\text{-}CH_2CH_2COCH_2CH_3$

6 Vapour pressure of pure water at 298 K is 23.8 mm Hg. 50 g of urea (NH_2CONH_2) is dissolved in 850 g of water. Calculate vapour pressure of water for this solution and its relative lowering. 2

OR

Calculate the mole fraction of ethylene glycol ($C_2H_4O_2$) in a solution containing $C_2H_4O_2$ by mass. (Atomic Mass : C= 12 u, H=1 u, O=16 u)

7 Complete the following reaction: 2

(a) $CH_3CH_2Cl \xrightarrow{\text{alc. KCN}}$ 'A' $\xrightarrow{\text{Reduction}}$ 'B'

(b) $C_6H_6 \xrightarrow[\text{Conc. } H_2SO_4,\ 333\text{ K}]{\text{conc. } HNO_3}$ 'A' $\xrightarrow{\text{Sn/ HCl}}$ 'B'

8 (a) What happens to reducing property of dioxides SO_2 to TeO_2 in group 16? 2

(b) What happens when PtF_6 and Xenon are mixed together at a high temperature.

9 Explain n-type and p-type semiconductor with one example for each. 2

10 (a) Classify following as addition and condensation polymers: Terylene, urea-formaldehyde resin, Polyacrylonitrile, Polypropylene 2

(b) Explain the difference between Buna-S and Buna- N

11 For the non-stoichiometric reaction 3

$2A + B \longrightarrow C + D$

The following data were obtained in three separate experiments , all at 298 K

S.No.	Intial conc [A]	Initial conc. [B]	Initial rate of reaction in mol
1	0.1 M	0.1 M	1.2×10^{-3}
2	0.1 M	0.2 M	1.2×10^{-3}
3	0.2 M	0.1 M	2.4×10^{-3}

(a) Calculate order w.r.t 'A' and 'B'

(b) What is the value of 'k' and its units.

12 (a) Why is the single O-O bond weaker than single S-S bond? 3

(b) $SbCl_5$ is more covalent than $SbCl_3$, why?

(c) Nitrogen exists as N_2, whereas phosphorus exists as P_4 . Why?

13 (a) Which of the following properties of colloids is not dependent on the charge on colloid particles? 3

Coagulation, electrophoresis, electro-osmosis, Tyndall effect

(b) Why is low temperature favorable for physisorption?

(c) Why is chemisorption specific in nature?

14 3

Ag^+	Br^-	Ag^+	Br^-	Ag^+	Br^-
Br^-		Br^-	Ag^+	Br^-	Ag^+
Ag^+	Br^-	Ag^+	Br^-	Ag^+	Br^-
Br^-	Ag^+	Br^-	Ag^+	Br^-	Ag^+

Answer the following questions:

(a) What type of stoichiometric defect is shown by the crystal?

(b) How is density of the crystal affected by this defect?

(c) What kind of ionic substance shows such defects?

OR

(a) Analysis show that ferrous oxide has the formula $Fe_{0.93}O_{1.00}$. What fraction of iron exists as Fe^{2+} and Fe^{3+} ions?

(b) Write a short note on Antiferromagnetism.

15 (a) What type of isomerism is shown by $[Cr(NH_3)_6][Co(CN)_6]$. Write the formula of the isomer and give its IUPAC name. 3

(b) Which of the following is more stable and why?
$[Fe(CN)_6]^{3-}$ or $[Fe(CN)_6]^{4-}$. (At. No. of Fe=26)

16 (a) Convert the following: 3

(i) Benzene to p-nitrotoluene

(ii) Benzaldehyde to Phenyl acetic acid

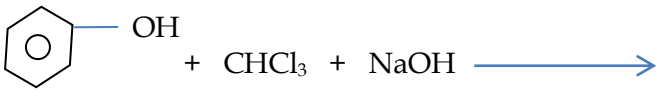
(b) Explain Hell Volhard Zelinsky Reaction

17 Distinguish between 3

(a) Pentan-2-one and Acetaldehyde

(b) Ethanamine and N,N-dimethyl ethanamine

(c) Complete the following



18 An organic compound (A) on treatment with acetic acid in presence of conc. H_2SO_4 produces and ester (B) with molecular formula $C_3H_6O_2$. 'A' on mild oxidation gives 'C'. "C' reacts with conc. KOH followed by acidification generates 'A' and 'D'. Identify A to D and write relevant equations. 3

19 (a) Name the element purified by 3

(i) Zone refining (ii) Van Arkel process

(b) The value of $\Delta_f G^0$ for formation of Cr_2O_3 is -540 KJ mol^{-1} and that of Al_2O_3 is -827 KJ mol^{-1} . Is the reduction of Cr_2O_3 possible with aluminium?

20 (a) Give two differences between electrolytic and electrochemical cells. 3

(b) $M|M^{2+}$ (saturated solution)| | M^{2+} (0.001)| M
The emf of above cell is 0.059 V . Calculate ΔG for the given cell. (F= 96500 C/mol)

(c) What is meant by electrochemical series.

21 (a) Why do transition metals show variable oxidation states? 3

(b) Which bivalent cation in 3d-transition series is the most paramagnetic and why?

(c) What is meant by lanthanoid contraction.

22 (a) What do you mean by denaturation of proteins. Give example. 3

(b) Name the deficiency of which vitamin cause the following diseases?

(i) Pernicious anaemia

(ii) Xerophthalmia

(c) Give one structural difference between amylose and amylopectin.

23 On occasion of World Health Day, Dr. Satpal organized 'Health Camp' for the poor farmers living in a nearby village. After check-up, he was shocked to see that most of the farmers suffered from cancer due to regular exposure to pesticides and many were diabetic. They distributed free medicines to them. Dr. Satpal immediately reported the government to the National Human Rights Commision (NHRC). On the suggestions of NHRC,the government decided to provide medical care, financial assistance setting up of super-speciality hospitals for treatment and prevention of the deadly disease in the affected villages all over India. 4

(a) Write the values shown by
  (i) Dr. Satpal
  (ii) NHRC
(b) What type of analgesics are chiefly used for the relief of pain of terminal cancer?
(c) Give an example of artificial sweetner that could have been recommended to diabetic patients.

24 (a) Write the mechanism of hydration of ethene to form ethanol. 5

(b) Complete the following reactions:

(i) $C_2H_5OH \xrightarrow{?} CH_3CHO \xrightarrow{?} CH_3CH(OH)C_2H_5$

(ii) $C_6H_5CHO + CH_3CHO \xrightarrow{\text{Dil. NaOH}}$

(c) Give the structure and IUPAC name of the major product obtained in the following reaction:

$C_6H_5NH_2 \xrightarrow{Br_2/H_2O}$

OR

(a) Write the mechanism of reaction of HI with ethoxyethane.
(b) How are the following conversions carried out?
  (i) Ethylbenzene to benzoic acid
  (ii) Propanol to propan-2-ol
(c) How would you distinguish between Phenol and Ethanol.

25 (a) Why is 'Ti' a transition metal but 'Zn' is not? 5
(b) Name two lanthanoids which are well known to show +2 oxidation states.
(c) What happens when SO_2 gas is passed through acidified $KMnO_4$ solution? Write balanced chemical equation.
(d) Write balanced equation when Cu^{2+} is treated with KI
(e) What is meant by disproportionation reaction? Illustrate it with example.

OR

(a) Complete the following reactions:
  (i) $CrO_4^{2-} + H^+ \longrightarrow$
  (ii) $Cr_2O_7^{2-} + SO_3^{2-} + H^+ \longrightarrow$

(b) How many moles of Ferrous oxalate can be oxidized by 1 mole of $K_2Cr_2O_7$ in acidic medium.

(c) Draw the structure of the following:

(i) CrO_4^{2-} (ii) MnO_4^-

26 (a) What will happen to cell if it is placed in hypertonic solution? 5

(b) The elevation in boiling point of 0.1 molal solution of 'X' in water is 0.1536 ^oC. What conclusion do you draw about molecular state of 'X' [K_b = 0.512 K Kg mol^{-1}]

(c) What type of deviation from Raoult's law is shown by cyclohexane and ethanol mixture?

(d) Why is osmotic pressure of 1M NaCl higher than 1M glucose solution?

OR

(a) 1M $NaNO_3$ solution has density 1.25 g cm^{-3}. Calculate its molality. (M Wt of $NaNO_3$ = 85 g mol^{-1})

(b) Can we separate azeotropes by fractional distillation? Give reason.

(c) A solution becomes warm on mixing. What type of deviation is shown by this solution?

(d) What is the value of 'i' for $Na_2SO_4.10H_2O$.