DISTRICT LEVEL II PUC PREPARATORY EXAM, JANUARY – 2024

Time: 3 Hrs. 15 Mins.   Sub: CHEMISTRY (34)   Max. Marks: 70

General Instructions:
1. The question paper has five parts. All the four parts are compulsory.
2. (a) Part – A carries 20 marks, each question carries one mark.
   (b) Part – B carries 06 marks, each question carries two marks.
   (c) Part – C carries 15 marks, each question carries three marks.
   (d) Part – D carries 20 marks, each question carries five marks.
   (e) Part – E carries 09 marks, each question carries three marks.
3. In Part – A question, first attempted answer will be considered for awarding marks.
4. Write balanced chemical equations and draw diagrams wherever necessary.
5. Direct answers to the numerical problems without detailed steps and specific unit for final answer will not carry any marks
6. Use log table and simple calculators if necessary. (Use of scientific calculator is not allowed).

PART – A

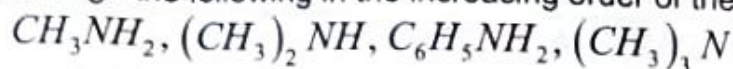I. **Select the correct option from the given choices:** 15 × 1 = 15

1. Acetic acid dissolved in benzene shows a molecular mass of
   (A) 30   (B) 60   (C) 120   (D) 180

2. Molar conductivity of electrolytic solution
   (A) increase with dilution
   (C) remains same
   (B) decreases with dilution
   (D) None of these

3. A certain half cell reaction $X + e^\ominus \rightarrow X^-$ has very large value of negative reduction potential, this implies that
   (A) X can be readily reduced
   (B) X can be readily oxidized
   (C) X^- can be readily reduced
   (D) X^- can be readily oxidized

4. Which of the following is an acceptable value of molecularity?
   (A) 5   (B) 0   (C) 3 / 2   (D) 2

5. In the transition series the element with highest melting point is
   (A) Mn   (B) Fe   (C) Cr   (D) Cu

6. The IUPAC name of $\left[Co(NH_3)_5 (NO_2) \right] Cl_2$ is
   (A) pentaammine nitrito – N – cobalt (III) chloride
   (B) pentaammine nitrito – O – cobalt (III) chloride
   (C) pentaammine nitrato – N – cobalt (III) chloride
   (D) None of these

7. The reactivity the following alkyl halides towards SN^2 reaction is in the order
   (A) $CH_3F < CH_3Cl > CH_3Br > CH_3I$
   (B) $CH_3F < CH_3Cl > CH_3Br > CH_3I$
   (C) $CH_3F < CH_3Cl > CH_3Br > CH_3I$
   (D) None of these

8. Which of the following has lowest boiling point?
   (A) Phenol   (B) o – nitrophenol   (C) p – nitrophenol   (D) m – nitrophenol

9. Rectified spirit is
   (A) ethyl alcohol mixed with methyl alcohol
   (C) 95.6% ethanol + 4.4% water
   (B) 50% ethanol + 50% water
   (D) 75% ethanol + 25% water

10. Highest boiling point among the following compounds CH_3CHO, CH_3CH_2OH, CH_3COCH_3, $CH_3 - CH_2 - CH_3$
    (A) CH_3COCH_3
    (C) $CH_3 - CH_2 - CH_3$
    (B) CH_3CHO
    (D) CH_3CH_2OH

P.T.O.

11. $CH_3 - CHO + HCN \rightarrow A$; compound A on hydrolysis gives
   (A) $CH_3 - CH_2 - COOH$
   (B) $CH_3 - CH_2 - CH_2 - NH_2$
   (C) $CH_3 - CO - COOH$
   (D) $CH_3 - CH - COOH$
   $\quad\quad\quad\quad\quad\quad\quad\quad\quad |$
   $\quad\quad\quad\quad\quad\quad\quad\quad\quad OH$

12. Which of the following gives carbylamines reaction
   (A) Aniline
   (B) N - methylaniline
   (C) N, N – dimethylaniline
   (D) dimethylamine

13. Arrange the following in the increasing order of their basic strength
   $CH_3NH_2, (CH_3)_2 NH, C_6H_5NH_2, (CH_3)_3 N$
   (A) $C_6H_5NH_2 > (CH_3)_3 N > CH_3NH_2 > (CH_3)_2 NH$
   (B) $(CH_3)_3 N > C_6H_5NH_2 > (CH_3)_2 NH > CH_3NH_2$
   (C) $CH_3NH_2 > C_6H_5NH_2 > (CH_3)_3 N > (CH_3)_2 NH$
   (D) $C_6H_5NH_2 < (CH_3)_3 N < CH_3NH_2 < (CH_3)_2 NH$

14. The carbohydrate which is essential constituent of plant cells is
   (A) Starch　　　　(B) Cellulose　　　　(C) Fructose　　　　(D) Maltose

15. Which of the following constitute the genetic material of the cell?
   (A) Nucleic acid　　　(B) Proteins　　　(C) Lipids　　　(D) Carbohydrates

II. **Fill in the blanks choosing the appropriate word from those given in the brackets:** 5 × 1 = 5
   [whole number, higher, decreases, Hydrogen bonding, DDT, low solubility]

16. The solubility gas in liquids _____ with the increase in temperature.

17. Molecularity of the reaction is always _____.

18. Interstitial compounds have _____ melting point then those of pure metals.

19. The substance which is not metabolized by the animals and many species of insects developed resistance to _____.

20. Tertiary amine have low boiling point than primary amines and secondary amines due to absence of _____.

PART – B

III. **Answer any THREE of the following questions. Each question carries two marks:** 3 × 2 = 6

21. What are azeotropes? Give example.

22. Define collision frequency and temperature co-efficient.

23. What is heteroleptic complex? Give an example.

24. Explain Swartz reaction with example.

25. $CH_3 – CHO$ is more reactive than CH_3COCH_3 towards nucleophilic addition reaction. Give reason.

26. What are hormones? Give an example.

PART – C

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

27. Describe the preparation of potassium permanganate from pyrolusite using chemical equations.

28. Calculate the spin only magnetic moment of $Mn^{+2}_{(aq)}$ ion (Z = 25).

29. What is lanthanoid contraction? Write any two of its consequences.

30. Write any three postulation of Werner's theory of coordination compounds.

31. Using VBT, explain geometry, hybridization and magnetic property of $\left[Ni(CN)_4 \right]^{-2}$ ion. [Atomic number of Ni is 27]

32. What are facial and meridional isomers? Give example.

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

33. (a) State Roult's law of relative lowering of vapour pressure and Henry's law.   [2M]
    (b) Define osmotic pressure.   [1M]

34. Describe the construction and working of SHE with neat labelled diagram.

35. Write the cathodic, anodic and overall reactions taking place in $H_2 - O_2$ fuel cell.

36. Derive the integrated rate equation for first order gas phase reaction.

PART – D

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

37. (a) Explain the mechanism of SN^2 reaction with example.   [3M]
    (b) What are enantiomers? Give example.   [2M]

38. (a) Explain the mechanism of hydrolysis of ethene to ethanol.   [3M]
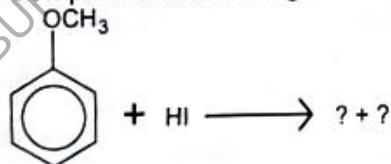   (b) Describe Williamson's ether synthesis.   [2M]

39. (a) What happens when phenol is treated with NaOH solution in the presence of $CHCl_3$? Give reaction.   [3M]
    (b) Complete the following: [2M]

OCH₃

⬡ + HI ⟶ ? + ?

40. (a) An organic compound with molecular formula C_6H_5Br on treatment with Mg in dry ether gives compound 'A'. The compound 'A' on treatment with CO_2 (dry ice) to form an addition compound 'B'. Then 'B' on acid hydrolysis gives 'C'. Identify the compound A, B and C.
    (b) Explain Clemmenson's reduction with an example.   [3M]
                                                            [2M]

41. (a) Explain aldol condensation reaction with example. [3M]
    (b) Write Hell – Volhard – Zelinsky reaction with example. [2M]

42. (a) Describe Gabriel's reaction with example. [3M]
    (b) Explain carbylamines reaction. [2M]

43. (a) Write the reaction two show six unbranched carbon atoms in glucose. [2M]
    (b) Write Haworth structure of $\alpha - D(+)$ glucopyranose. [2M]
    (c) Name the disease caused by the deficiency of Vitamin C. [1M]

PART – E

VII. **Answer any <u>THREE</u> of the following. Each question carries THREE marks:** $3 \times 3 = 9$

44. An aqueous solution of glucose is 10% by mass of glucose at 303K. the vapour pressure of pure water at 303K is 32.8 mm of Hg. What is the vapour pressure of solution?

45. An aqueous solution of 0.6 g of a solute 'X' in 27.1 g of water freezes at 272.187 K. If the cryoscopic constant of water is $1.86 K\,Kg\,mol^{-1}$, calculate the molecular mass of X.

46. The equilibrium constant for the following cell reaction was found to be 6.509×10^{8}. Calculate the standard cell potential. $Cd_{(s)} + Sn^{+2}_{(aq)} \rightarrow Cd^{+2}_{(aq)} + Sn_{(s)}$
    $(R = 8.314 Jk^{-1}mol^{-1}, F = 96500\,C)$

47. Calculate the molar conductance of 0.15M acetic acid solution if its conductivity at 298K is $1.6 \times 10^{-4} Scm^{-1}$.

48. Half- life period of a first order reaction is 30 seconds. Calculate the time required for the 2/3rd completion of the reaction.

49. A reaction is found to have a rate constant 3.46×10^{-5} at 25^{0}C and a rate constant 4.87×10^{-3} at 65^{0}C. Calculate activation energy for the reaction. $(R = 8.314 Jk^{-1}mol^{-1})$. -

❖❖❖❖❖❖❖❖❖