JAIN COLLEGE V V Puram **1st PUC MOCK Paper – Feb. 2023**	**Course:** 1st year PUC **Subject:** Chemistry **Max. Marks:** 70 **Duration:** 3:15 hour

Instructions:

The question paper has four parts. All the four parts are compulsory PART -A carries 20 marks, each question carries one mark.

PART- B carries 8 marks. Each question carries two marks

PART -C carries 12 marks. Each question carries three marks PART-D carries 30 marks. Each question carries five marks ii. Write balanced chemical equations and draw diagrams wherever necessary 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. **1 x 15 = 15**

1. Express 5L of milk in cubic meter.

   a) $5x10^{-3}\ m^3$ b) $0.5 \times 10^{-3} m^3$ c) $50.0 \times 10^{-3} m^3$ d) $0.05 \times 10^{-3} m^3$

2. Which of the following is the correct order of size of the given species

   a) $I > I^- > I^+$ b) $I^+ > I^- > I$ c) $I > I^+ > I^-$ d) $I^- > I > I^+$

3. The correct geometry and hybridization of PCl_5 is

   a) Trigonal bipyramidal,sp^3d b) Planar triangular, sp^3d^3

   c) Square planar,sp^3d d) Octahedral,sp^3d^2

4. Surface tension vanishes at

   a) Boiling point b) Critical point c) Condensation point d)Triple point

5. Which one of the following equation does not correctly represent the first law of thermodynamics for the given process ?

   a) Isothermal process; $q = -w$ b) Cyclic process; $q = -w$

   c) Isochoric process; $\Delta E = q$ d) Adiabatic process $\Delta E = -w$

6. Le Chatelier's principle is not applicable to

   a) $Fe_{(s)} + S_{(s)} \rightleftarrows FeS_{(s)}$ b) $H_{2_{(g)}} + I_{2_{(g)}} \rightleftarrows 2HI_{(g)}$

   c) $N_{2_{(g)}} + 3H_{2_{(g)}} \rightleftarrows 2NH_{3_{(g)}}$ d) $N_{2_{(g)}} + O_{2_{(g)}} \rightleftarrows 2NO_{(g)}$

7. In which of the following compounds, carbon exhibits a valency of 4 but oxidation state of -2

   a) CH_3Cl b) $CHCl_3$ c) CH_2Cl_2 d) HCHO

8. Which of the following molecules can act as both oxidizing and reducing agent?

   a) H_2S b) SO_3 c) H_2O_2 d) F_2

9. Dead burnt plater is

a) $CaSO_4$ b) $CaSO_4.\frac{1}{2}H_2O$ c) $CaSO_4.H_2O$ d)$CaSO_4.2H_2O$

10. Conc HNO_3 is stored in a container made up of?

a) Cu b) Zn c) Al d)Sn

11. Which of the following metallic oxide exhibits amphoteric nature?

a) CaO b) Al_2O_3

c) Na_2O d) BaO

12. .During the fusion of organic compound with sodium metal, nitrogen of compound is

a) $NaNO_2$ b) $NaNH_2$

c) NaCN d) NaNC

13. The number of $1^{\circ}, 2^{\circ}, 3^{\circ}$ and 4° carbons in neopentane are respectively

a) 4,3,2,1 b) 5,0,0,1 c) 4,0,0,1 d) 4,0,1,1

14. 2-hexyne can be converted into trans-2-hexene by the action of

a) H_2-Pd/$BaSO_4$ b) Li/liq NH_3 c) H_2-Pt/O_2 d) $NaBH_4$

15. Excess of nitrate in drinking water can cause

a) Blue baby syndrome b) Kidney damage c)Liver damage d) Leucoderma .

II. Fill in the blanks by choosing the appropriate word from those given in the brackets:

[Fluorine, kgm^{-3}, ZSM-5, ethylene glycol, bronsted acids] **1 x 5 = 5**

16. The SI unit of density is_____

17. _____ is the most electronegative element in the periodic table

18. Proton donors are called _____

19. An example of Zeolite is_____

20. Ethylene reacts with 1% cold alkaline $KMnO_4$ to form _____

PART-B

III.Answer any four of the following. Each question carries two marks. 4 x 2 = 8

21. How many atoms of Hydrogen are present in one mole of water?

22. Derive Ideal gas equation.

23. Write any two difference between Bonding Molecular Orbital and Anti-bonding Molecular Orbital.

24. What happens when Cl_2 is passed through milk of lime? Write the chemical reaction.

25. What are Zeolites? Give an example.

26. Discuss the mechanism of addition of HBr to propene .

27. a) State Huckel's rule for aromaticity.

b) Name the reagent of decarboxylation reaction.

28. What are non-degradable pollutants? Give an example?

PART –C

IV. Answer any four of the following. Each question carries three marks 4 x 3 = 12

29. a) Write the general outer electronic configuration of d-block elements
b) State modern periodic law.
c) Define Electronegativity. (1+1+1)

30. Calculate the formal charge on each oxygen atom in ozone. (3)

31. a) Explain the formation of BCl_3 molecule on the basis of hybridisation.
b) Between O_2 and O^{2-}, Which one has the higher bond order? (2+1)

32. Explain the formation of N_2 molecule based on Molecular Orbital Theory. (3)

33. Balance the redox reaction by half reaction method

$Fe^{2+}(aq) + Cr_2O_7^{2-}(aq) \rightarrow Fe^{3+}(aq) + Cr^{3+}(aq)$ (3)

34. a) Explain the process of softening of temporary hardness of water by Clark's method.
b) Give an example for ionic hydrides. (2+1)

35. a)Give the diagonal relationship between Li and Mg.
b)Name the gas liberated when alkali metal reacts with water. (2+1)

36. a) How is orthoboric acid prepared from Borax?
b) What is dry ice? (2+1)

PART-D

V. Answer any four of the following. Each question carries five marks. 3 x 5 = 15

37. a) 50.0 kg of $N_2(g)$ and 10.0kg of H_2 are mixed to produce $NH_3(g)$.Calculate the mass of $NH_3(g)$ formed.Identify the limiting reagent in the production of NH_3.
b) A jug contains 2L of milk. Calculate the volume of the milk in m^3. (3+2)

38. a) Give four postulates of Bohr's theory of Atomic model.
b) Give two differences between Orbit and Orbital.

39. a) Explain the significance of any three quantum numbers.

b) Give two differences between Orbit and Orbital. (3+2)

40. a) Mention any four postulates of Kinetic theory of gases.

b) Define critical temperature. (4+1)

41. a) Calculate the lattice enthalpy of NaCl using Born-Haber cycle

b) Calculate the maximum work done during the expansion of one mole of an Ideal gas from a volume of 10 litres to 20 litres at 298K. (Given $R=8.314 JK^{-1}mol^{-1}$) (3+2)

42. a) Calculate the standard Enthalpy of formation of methanol. Given that enthalpy of combustion of carbon hydrogen and methanol are -393.5kJmol^{-1}, -285.83kJmol^{-1} and -726.3kJmol^{-1} respectively.
b) Derive the relation between Cp and Cv. (3+2)

43. a) Calculate the pH of 0.01M H_2SO_4 by assuming complete ionization .
b) Write the Henderson-Hasselbalch equation for basic buffer.
c) State Le Chartlier's Principle.
d) Define Common ion effect (2+1+1+1)

44 a) Derive Ostwald's dilution law for a weak electrolyte.
b) A saturated solution of AgCl contains 1.46x10^{-3}gdm^{-3} at 291K. What is the solubility product of AgCl at this temperature? (3+2)

VI. Answer any three of the following. each question carries five marks 3 x 5= 15

45. a) Write the principle and calculation involved in the estimation of carbon present in organic compound by Liebig's method .
b)What is position isomerism ?Give an example (3+2)

46. a) What are homologues series? Mention any two characteristics.
b)Give any two differences between Inductive and Electromeric effect. (3+2)

47. a) Explain the mechanism of Chlorination of methane.
b)Name the reagents used for the following conversions
i) but-2-yne to Cis but-2-ene
ii) chloroethane to ethene (3+2)

****