JAIN COLLEGE V V Puram **1st PUC MOCK – Jan. 2025**	**Course:** I PUC **Subject:** Chemistry **Max. Marks:** 70 **Duration:** 3:00 hour

PART A

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

1. The number of significant figures in 0.0098 is.
   a) 1 b) 2 c) 3 d) 4
2. The isoelectronic pair of F^- is
   a) Na^+ b) Cr^{2+} c) Fe^{2+} d) Zn^{2+}
3. Mendeleev arranged the elements in the periodic table on the basis of
   a) atomic no b) atomic weight c) mass no d) all of these
4. The number of lone pair and bond pair of electrons present in ammonia is
   a) 1, 2 b) 1,3 c) 2,2 d) 2,1
5. The type of chemical interaction present in ice is
   a) hydrogen bonding b) dispersion force
   c) dipole-dipole force d) electrostatic force
6. During the conversion of water in to ice entropy
   a) decreases b) increases c) remains constant d) none of these
7. Which of the following is an extensive property?
   a) internal energy b) density c) temperature d) viscosity
8. The conjugate acid pair of NH3 is
   a) NH4+ b) NH2- c) OH- d) none of these
9. The PH of 1M HCL is
   a) 1 b) 0 c) 5 d) 7
10. An decrease in oxidation number of an element in a given substance is called
    a) oxidation b) redox c) reduction d) disproportionation
11. Identify the oxidising agent in $Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$
    a) Zn b) Zn^{2+} c) Cu d) Cu^{2+}
12. The number of sigma and pi bonds present in benzene is
    a) 3, 2 b) 6,3 c) 12,3 d) 12,6
13. Two liquids with more difference in boiling point are separated by
    a) simple distillation b) steam distillastion
    c) fractional distillation d) separating funnel
14. The reagent used to convert bromoethane to ethene is
    a) H_2-Pd/$BaSO_4$ b) Li/liq NH_3 c) aq KOH d) alc KOH
15. butane and 2-methyl propane are …….. isomers
    a) chain b) position c) functional d) geometrical

II. Fill in the blanks by choosing the appropriate word from those given in the brackets: 1 x 5 = 5

[ethene,2,2 dimethylpropane ,sodalime ,-57.3kJmol^{-1} , candela]

16. The SI unit of luminous intensity is _____
17. _____ is the reagent used for decarboxylation.
18. Standard enthalpy of neutralization of NaOH and HCl is _____.
19. The IUPAC name of neo-pentane is _____.
20. The product formed when ethanol is heated with conc sulphuric acid is _____.

PART B

III. Answer any five of the following. Each question carries two marks. 5 x 2 =10

21. Calculate the number of molecules present in 10 mg of water.
22. Show that pH+pOH =14
23. Write the molecular orbital configuration of carbon molecule.
24. What are intensive property? Give an example.
25. State pauli's exclusion principle.
26. Explain Friedal-craft reaction with suitable example.
27. Give equation for the conversion of ethyne to ethene. Name the reaction.
28. Calculate the oxidation number of Mn in $KMnO_4$.
29. Mention the conditions for a reaction to be spontaneous.

PART C

IV. Answer any three of the following. Each question carries three marks 3 x 3 = 9

30. a) Write the general outer electronic configuration of d-block elements
    b) How does atomic radii vary across the period and down the group? (1+2)
31. Calculate the formal charge on all the oxygen atom in ozone.
32. Explain the formation of BF_3 molecule based on hybridization. (2+1)
33. Explain the formation of NH_3 molecule based on VSEPR theory.
34. Balance the redox reaction by half reaction method in acidic medium
    $Fe^{+2} + Cr_2O_7^{2-} \text{----------} > Fe^{+3} + Cr^{3+}$

V. Answer any three of the following. Each question carries three marks 3 x 3 = 9

35. Explain the emission spectrum of hydrogen with a neat labeled diagram.
36. What are Quantum numbers? Mention significance of all four quantum numbers.
37. For the element Cr,
    1) Wrtie the electronic configuration
    2) How many unpaired electrons present in it?
    3) To which block of the periodic table it belongs?
38) Derive the relationship between C_P and C_V for an ideal gas.
39) Derive Ostwald dilution law for a weak acid.
40) a) What is common ion effect?
    b) Derive the relation between solubility and solubility product of salt of type AB_2

PART-D

VI. Answer any TWO of the following. Each question carries five marks. 5 x 2=10

41) a) Write the principle and calculation involved in the estimation of carbon and hydrogen present in organic compound by Liebig's method.

b) What is functional isomerism? Give an example

42. a) Explain the mechanism of chlorination of methane.

b) Give any two differences between electromeric and mesomeric effect.

43. a) Explain the mechanism of Friedal-craft acylation of benzene.

b) Draw the sawhorse confirmation of ethane.

44. a) Explain the formation of benzene from sodium benzoate.

b) Give equation for the following conversions:

i) Phenol to Benzene.

ii) calcium carbide to acetylene.

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

45. An Organic compound contains 26.66% carbon, 2.22% hydrogen and 71.12% oxygen. The molecular mass of the compound is 90. Find molecular formula.

46. Dinitrogen and dihydrogen react with each other to produce ammonia according to the following chemical equation. $N_2(g) + 3H_2(g)$ ------> $2NH_3(g)$ Calculate the mass of ammonia produced if 2×10^3 g dinitrogen reacts with 1×10^3 g of dihydrogen.

47. Calculate the wave number and wavelength of first line in Balmer series of hydrogen spectrum. (Given: $R_H = 1.09677 \text{ X } 10^7 \text{ m}^{-1}$)

48. Calculate the energy of one mole of photon of radiation whose frequency is 5x1014 Hz.

49. The standard enthalpies of combustion of carbon, hydrogen and C6H6 are -393.5 $kJmol^{-1}$, -285.83 $kJmol^{-1}$ and -3267 $kJmol^{-1}$ respectively. Calculate the standard enthalpy of formation of C_6H_6.

50. Calculate the total work done when one mole of a gas expands isothermally and reversibly from an initial volume of 10 dm^3 to a final volume of 20 dm^3 at 298 K. (R = 8.314 JK-1 mol^{-1})

51. Calculate ΔG^0 for the hydrolysis of sucrose. The equilibrium constant K_C is 2×10^{-3} at 300 K. (R = 8.314 JK^{-1} mol^{-1}).

52. K_a for CH_3COOH is 1.8 x 10^{-5} and K_b for NH_4OH is 1.8 x 10^{-5}.Calculate the pH of ammonium acetate?

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