I. Choose the correct answer: 25x1=25

1. The number of water molecules in a drop of water weighing 0.018g is _____.

   a) 6.022×10^{26} b) 6.022×10^{23} c) 6.022×10^{20} d) 6.022×10^{22}

2. The equivalent mass of potassium permanganate in alkaline medium is _____.

   a) 31.6   b) 52.7   c) 79   d) none of these

3. Total number of electrons present in 1.7g of ammonia is _____.

   a) 6.022×10^{23} b) $6.022 \times 10^{22}/1.7$

   c) $6.022 \times 10^{24}/1.7$ d) $6.022 \times 10^{23}/1.7$

4. Which of the following is the standard for atomic mass?

   a) $_{,}H'$ b)$6^{C^{12}}$ c) $6^{C^{14}}$ d) $8^{0^{16}}$

5. Which one of the following is not a redox reaction?

   a) Rusting of iron   b) Extraction of metal Na

   c) Electroplating   d) Aluminothermic process

6. Match list-I with list-II and choose the correct answer code.

List - I (Acids)	List-II (Basicity)
A. Hcl	1. 3
B. H_2SO_4	2. 4
C. $H_4P_2O_7$	3.2
D. H_3PO_4	4.1

Code

	A	B	C	D
a)	4	3	2	1
b)	3	4	1	2
c)	1	4	3	2
d)	4	1	3	2

7. Which of the following does not show oxidising behaviour?

    a) $Cu + 2H_2SO_4 \rightarrow CuSO_4 + SO_2 + 2H_2O$

    b) $C + 2H_2SO_4 \rightarrow CO_2 + 2SO_2 + 2H_2O$

    c) $Bacl_2 + H_2SO_4 \rightarrow BaSO_4 + 2HCl$

    d) none of the above

8. An element x has the following isotopic composition $x^{200}=90\%$, $x^{199}=8\%$ and $x^{202}=2\%$. The weighed average atomic mass of the element X is closest to _____

   a) 201u   b) 202u   c) 199u   d) 200u

9. The equivalent mass of ferrous oxalate is _____.

   a) molar mass of ferrous oxalate /1

   b) molar mass of ferrous oxalate /2

   c) molar mass of ferrous oxalate/3

   d) none of these

10. Which of the following is a diatomic molecule?

   a) Ozone   b) Copper   c) Hydrogen   d) Gold

11. Splitting of spectral lines in an electric field is called _____.

   a) Zeeman effect   b) Shielding effect

   c) Compton effect   d) Stark effect

12. Two electrons occupying the same orbital are distinguished by _____.

   a) azimuthal quantum number   b) spin quantum number

   c) magnetic quantun number   d) orbital quantum number

13. Which of the following paris of d- orbitals will have elecron density along the axes?

   a) d_{z^2}, d_{xz} b) $d_{z^2}, d_{x^2}-y^2$ c) d_{xz}, d_{yz} d) $d_{xy}, d_{x^2-y^2}$

14. If n=6, the correct sequence for filling electrons will be,_____.

   a) ns→ (n-2)f → (n-1)d → np   b) ns→(n-1)→(n-2)f→ np

   c) ns→ $(n-2)$f→np→(n-1)d   d) None of these are correct

15. The maximum number of electrons in a sub shell is given by the expression.

    a) $2n^2$ b) $2l + 1$ c) $4l+2$ d) n+1

16. Time independent schodinger equation is _____ .

    a) $\hat{H}\psi = E\psi$ b) $\nabla^2\psi + \frac{8\pi^2 m}{n^2}(E+V)\ \psi = 0$

    c) $\frac{\partial^2 4}{\partial x^2} + \frac{\partial^2 4}{\partial y^2} + \frac{\partial^2 4}{\partial 3^2} + \frac{2m}{h^2}(E-V) = 0$ d) all of these

17. If uncertainty in position and momentum are equal then minimum uncertainty in velocity is _____

    a) $\frac{1}{m}\sqrt{h/11}$ b) $\sqrt{h/11}$ c) $\frac{1}{2m}\sqrt{h/11}$ d) $\frac{h}{4\pi}$

18. Who proposed the dual nature of light to all forms of matter?

    a) John Dalton   b) Neils Bohr   c) Albert Einstein   d) J.J Thomson

19. Assertion (A) : Cr with electronic configuration [Ar] $3d^5\ 4s^1$ is more stable than [Ar]4S² $3d^4$

    Reason (R) : Half filled orbitals have been found to have extra stability than partially filled orbitals

a) A and R are correct and R is the correct explanation of A

b) A and R are correct but R is not the correct explanation of A

c) A is correct but R is wrong

d) A is wrong but R is correct

20. de=Broglie equation is _____ .

    a) $\lambda = h/mv$ b) m=hγ   c) λ/h d) h = λ/mv

21. The energy of light of wavelength 45nm is _____ .

    a) $6.67 \times 10^5 J$ b) $6.67 \times 10^{11} J$

    c) $4.42 \times 10^{-18} J$ c) $4.42 \times 10^{-15} J$

22. Electron density in he yz plane of 3dxy orbital is

    a) Zero   b) 0.50   c) 0.75   d) 0.90

23. How many electrons in an atom with atomic number 105 can have (n+1)=8?

    a) 30   b) 17   c) 15   d) unpredictable

24. The oxidation number of O_2 is _____ .

    a) +1   b) +2   c) zero   d) -1

25. How much volume of CO_2 is produced when 50g of $CaCO_3$ is heated strongly?

    a) $2.24 \times 10^{-2} m^3$ b) 22.4L   c) 11.2L   d) 22400 Cm³

II. Answer any 10 of the following: 10x2=20

26. Define mole

27. What is the empirical formula of the following?

    i) Fructose $(C_6H_{12}O_6)$ ii) Caffeine $(C_8H_{10}N_4O_2)$

28. How will you calculate the equivalent mass of sulphuric acid?

29. Mass of one atom of an element is 6.645×10^{23} g. How many moles of element are there in 0.320kg?

30. Give some oxidation reactions taking place in our daily life.

31. Identify the following reactions.

    i) $2H_2O_2 \rightarrow 2H_2O + O_2$ ii) $C + O_2 \rightarrow CO_2$

32. What is Zeeman effect?

33. How many orbitals are possible in the 4th energy level? (n=4)

34. Draw the structure of P-orbitals

35. State Hund's rule.

36. Give the actual electronic configuration of Cr(z=24) and Cu (z=29)

37. Which quantum number reveal information about the shape, energy, orientation and size of orbitals?

Part-III

Answer any ten of the following in brief: 10x3=30

38. Explain time independent schrodinger equation .

39. The stabilisation of a half filled d-orbital is more pronounced than that of P-oribtal. Why?

40. Give the limitations of Bohr's atom model.

41. State Heisenberg's uncertainty principle.

42. Which has the stable electronic configuration? Ni^{2+} Or Fe^{3+}.

43. Write all quantum numbers of electrons in L shell.

44. Calculate the oxidation number of the underlined element.

i) $\underline{Cr}_2O_7^{2-}$ b) $K\underline{Mn}O_4$ iii) $\underline{S}O_2$

45. Calculate the percentage Composition of the element Mg present in $MgCO_3$.

46. What is gram equivalent mass? Give the formula to find it.

47. Draw a flowchart to illustrate the classification of matter.

48. Calculate the molecular mass of the following

i) Ethanol (C_2H_5OH) ii) Potassium dichromate $(K_2Cr_2O_7)$

49. How many moles of hydrogen is required to produce 10 moles of ammonia?

Part-IV

Answer the following in detail: 5x5=25

50. a) Explain Decomposition reaction and disproportion reaction with example.

(or)

b) i) Balance the equation by ion electron method

$C_2O_4^{2-}$ + $Cr_2O_7^{2-}$ → Cr^{3+} +CO_2 (acid medium)   (3)

ii) Define oxidation and reduction in terms of electronic concept

(2)

51. a) In a reaction $x+y+z_2 \rightarrow xyz_2$ identify the limiting reagent if any, in the following reaction mixtures.

i) 200 atoms of x + 200 atoms of y + 50 molecules of Z_2.

ii) 1 mole of x + 1 mole of y + 3 moles of Z_2.

iii) 50 atoms of x + 25 atoms of y+50 molecules of Z_2

iv) 2.5 mole of x + 5 mole of y + 5 mole of x 2

(or)

b) i) State Avogadro's hypothesis   (2)

ii) What is relative atomic mass?   (3)

52. a) By applying the knowledge of chemical classification classify each of the following into elements compounds or mixtures.

i) Naphthalene balls,   ii) Sugar   iii) Carbondioxide

iv) Distilled water   v) nickel rod   vi) Table salt

vii) Sea water   viii) Green tea   ix) Silver plate

x) Copper sulphate

(or)

b) Calculate the empirical and molecular formula of a compound containing 76.6% carbon, 6.38% hydrogen and rest oxygen, its vapour density is 47.

53. a) Explain the postulates of Bohr's atom model.

(or)

b) i) Define orbital   (2)

ii) Explain Magnetic quantum number.   (3)

54. a) Energy of an electron in hydrogen atom in ground state is -13.6ev. What is the energy of the electron in the second excited state?

(or)

b) i) State Pauli's exclusion principle with example   (3)

ii) What do you understand by the term oxidation number.