PAPER IX

1. What is clausius-Mossotti relation? Write down the Debye equation relating the dielectric constant and dipole moment of a polar molecules.
2. Explain a short note on Nernst distribution law. Derive phase rule for non reacting system. What is meant by (i) a triple point (ii) an eutectic point (iii) How many triple points do you expect in sulpher system.
3. What is total thermodynamic probability ? Derive the mathematical expression of total thermodynamic probability of a system having total energy E & no of partical N considering it as a microcanonical ensemble system.
4. What is the essential condition for a molecules to be I.R active. Write down the Maxwell-Boltzmann statistical distribution law explaining all the terms.
5. What is photoelectric effect.Write the Einstein equation for the photoelectric effect explaining all the terms.Write the energy expression term of particle in a 3D box.
6. State and explain the law of photochemical equivalence. Deduce the stern volmer equation for dynamic quenching of fluorescence.Show that absorbance is an additive property where transmittance is a multiplicative property.
7. Write the Hamiltonian operator for Li atom explaining each term. Draw energy level diagram to explain bonding in HF molecules and write the wave functions of the molecular orbitals
8. Draw $R_{2,0}$, $R_{2,0}^2$, $r^2 R_{2,0}^2$ versues r for H . Of which of the following operators is the function $e^{-x2/2}$ an eigen function ?

   d^2/dx^2 ,d/dx , 1/x d/dx

PAPER VIII

9. Write down a Short Note on electronic transition with reference of σ to σ*, n to σ*, Π to Π* and n to Π*
10. Discuss the solvent effect on different electronic transition.
11. What do you mean by shielding and desheilding effect of protons.
12. What is Woodward rules with reference to conjugated diene and α,β unsaturated carbonyl compounds.
13. Discuss Cram's and Felkin rule with suitable examples.
14. Write down the synthetic utility of DDQ, HIO_4, m-CPBA, $Pb(OAc)_4$, Trimethyl silyl chloride.
15. Write down a short note on electrophilic and nucleohilic substitution on pyrrole, indole, quinoline and isoquinoline.
16. Write a short note on Favorskii, Demjanov rearrangement.

PAPER – VII

1. Calculate the number of unpaired electrons in $[Mn(H_2O)_6]^{2+}$.
2. Compare the Δ_O of $[Cr(H_2O)_6]^{2+}$ and $[Cr(H_2O)]^{3+}$.
3. Draw the d-orbital splitting diagram of $[CoF_6]^{3-}$ and calculate the CFSE.
4. Predict the magnetic property of $[Fe(CN)_6]^{4-}$.
5. Draw the structure of a molecule with point group C_{2h}.
6. Write two differences between diamagnetism and paramagnetism.
7. What do you mean by Neel temperature?
8. What is anti ferromagnetism?
9. State Curie's Law.
10. Assign the point groups of the following: a) H_2O b) BF_3.
11. Calculate the magnetic moment of Ce^{3+}.
12. Calculate the spin only magnetic moment of square planar $[Ni(en)_2]^{2+}$.
13. What is Zeise's salt? Draw its structure.
14. Name one platinum complex having medicinal importance and indicate its plausible mechanism of action.
15. Give one example of each of Pt(VIII) and Pt(V) compounds.
16. Draw the structure of heme-a moiety.
17. Give a method of preparation of organo-aluminium compound.
18. Draw the structure of calcium complex of ATP.
19. Write two toxic effects of each of lead and mercury in bio chemical system.
20. How ferrocene is prepared ?
21. Compare the oxidation states of V, Nb, Ta.
22. Draw the structural formula of $Al(CH_3)_3$.
23. Draw the structure of tetraphenyl porphyrin.
24. What do you mean by active transport?