Unit-4

Q-1 (a) Differentiate between Enantiomers and Diastereomers? (5)

(b) Write a short note on :- (3 marks each)
Chirality, optical Isomerism, Geometrical Isomerism

Q-2 Explain different type of structural Isomerism with examples? (10 marks)

Q-3 Write short note on Symmetry (5 marks)
(b) R/S Nomenclature
(c) E/Z Nomenclature
(d) CIP Rules

Q-4 Write the conformational Analysis for N-butane along with its energy graph (10 marks)

Q-5 Write short note on
(a) Substitution Rx with Example
(b) Addition Rx with Example
(c) Elimination Rx with Example.

Q-6. What is drug? How is Paracetamol/Aspirin Synthesized. Give it uses too.

Unit-1

Q-1 Draw the molecular Orbital energy level diagram for CO | O_2 | N_2, Also find bond order and magnetic property of compound (10 marks)

Q-2 Define, orbital and difference between σ and π Molecular orbital. (5 marks)

Q-3 Write salient features of Molecular Orbital theory focussing on LCAO? -

Q-4 Draw pie molecular Orbital diagram of Butadiene | Benzene (10 marks)

Q-5 Write short note on :-
(a) Aromaticity (with Huckel Rule)
(b) Extrinsic semiconductor / Intrinsic Semicond
(c) Doping on Band structure

Q-6 What is Crystal Field stabilization Energy. How is it calculated in tetrahedral, octahedral & square planar field of ligands

Q-7 Draw Energy level diagram for $[Co(NH_3)_6]$, $[Ni(CO)_4]$ $[PtCl_2(NH_3)_2]$

Unit-3
Thermodynamics

Q-1 Explain the following terms.
(1) Internal Energy
(2) Enthalpy
(3) Entropy.
(4) Laws of Thermodynamics
(5) Gibbs free Energy.

Q-2 Prove

$$\Delta S = nC_p \ln \frac{T_2}{T_1} - nR \ln \frac{P_2}{P_1}$$

~~Q-3 Derive Nernst E~~

Q-3 Derive Nernst Equation

Q-4 Define cell potential ? How it will be measured.

Q-5 Numerical on Nernst Eq, Free Energy & EMF of the cell, Cell potential, Entropy.

Periodic Properties

Q-1 Explain the terms :-
(a) polarization, polarizability & its significance
(b) Hard & soft Acids & Bases
(c) Ionization Energy

(d) Electronegativity
(e) Electron affinity
(f) Effective Nuclear Charge
(g) Atomic & Ionic Radii
and their variation along a period (left to right) and in group (top to bottom)

Q-2 Define Co-ordination Number and related geometries with an Example.

Q-3 Give molecular geometry of the following
(a) H_2O, (b) NH_3, (c) PCl_5, (d) SF_6 (e) CCl_4

Unit-2

Q-1 Define principle of spectroscopy stating Selection Rules

Q-2 Define the following
(a) Bathochromic Shift
(b) Hypsochromic Shift
(c) Hyperchromic Shift
(d) Hypochromic Shift
} U.V Spectroscopy

(e) Chemical Shift
(f) Shielding / diashielding
(g) Coupling constant
} NMR Spectroscopy

(h) Vibrational spectroscopy
(i) Rotational Spectroscopy
} For diatomics

(j) Diffraction and Scattering

Q-3 Explain stretching and Bending vibration with respect to IR spectroscopy

Q-4 Write short note on MRI

Q-5 Explain Fluorescence & Phosphorescence in detail

Q-6 Define Principle of NMR Spectroscopy & what type of Nuclei show NMR Spectra.