

LESSON PLAN

Course Title: Chemistry

Course No.: BS-101A

Name of the Teacher: Dr Niti Sakhuja and Dr Vikas Bhardwaj

LECTURES TOPICS

Unit -I	Atomic and molecular structure
Lect. No.	Topics to be covered
L1	Molecular orbitals of diatomic molecules (N_2 , O_2 , CO)
L2	Equations for atomic and molecular orbitals.
L3	Energy level diagrams of diatomics.
L4	Pi-molecular orbitals of butadiene aromaticity.
L5	Pi-molecular orbitals of benzene
L6	Aromaticity and Huckel Rule
L7	Crystal field theory, Postulates
L8	Energy level diagrams of $[Co(NH_3)_6]$, $[Ni(CO)_4]$, $[PtCl_2(NH_3)_2]$
L9	Magnetic properties of metal complexes
L10	Band structure of solids
L11	The role of doping on band structures.
Unit -I I	Spectroscopic techniques and applications
L 12	Principles of spectroscopy
L 13	selection rules
L 14	Electronic spectroscopy(basic concept).
L15	Fluorescence
L 16	Applications of fluorescence in medicine
L 17	Vibrational spectroscopy of diatomic molecules
L18	Rotational spectroscopy of diatomic molecules
L 19	Applications of Vibrational spectroscopy and Rotational spectroscopy
L20	Basic concepts of Nuclear magnetic resonance
L 21	Magnetic resonance imaging,
L 22	Diffraction

L 23	scattering.
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Unit -III	Use of free energy in chemical equilibria
L 24	Thermodynamic functions: energy, entropy and free energy
L 25	Estimations of entropy
L26	Estimations of free energy
L 27	Free energy and emf.
L 28	Cell potentials, the Nernst equation and applications.
L29	The Nernst equation and applications.
UNIT- III	Periodic properties
L30	Effective nuclear charge,
L 31	penetration of orbitals
L 32	variations of s, p, d and f orbital energies of atoms in the periodic table
L 33	Variations in electronic configurations
L 34	Variations in atomic and ionic sizes, ionization energies,
L 35	Variations in electron affinity and electronegativity
L 36	Variations in polarizability, oxidation states, coordination numbers and geometries
L 37	hard soft acids and bases
L 38	Molecular geometries (H ₂ O, NH ₃ , PCl ₅ , SF ₆ , CCl ₄ , Pt(NH ₃) ₂ Cl ₂)

Unit IV	Stereochemistry
L39	Representations of 3 dimensional structures
L 40	structural isomers and stereoisomers
L 41	configurations and symmetry
L 42	chirality, enantiomers and its Properties
L 43	Diastereomers and its properties

L 44	optical activity, absolute configurations
L 45	conformational analysis.
Unit IV	Organic reactions and synthesis of a drug molecule
L 46	Introduction to reactions involving substitution reactions
L 47	Elimination reactions and its mechanism
L 48	Addition, cyclization and ring openings reactions
L 49	Oxidation and reduction, reactions and its mechanism
L 50	Synthesis of a commonly used drug molecule (paracetamol and Aspirin)