INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR

1. **Name of the Academic Unit: Department of Chemistry (CY)**

2. **Subject Name: Fundamentals of Inorganic Chemistry L-T-P: 3-1-0 Credits: 4**

3. **Pre-requisites: - NA-**

4. **Syllabus and reference books:**

Syllabus:

1. Atomic Structure and Periodic Properties (12 lectures]

Bohr's model, Sommerfeld's extension, de Broglie's wave-particle duality; Heisenberg's uncertainty principle and Schrödinger's equation (qualitative); significance of ψ and ψ^2. Periodic properties: ionic and covalent radii, electronegativity, ionization potential, electron affinity.

2. Bonding and Structure (12 lectures)

Different bonds: ionic, covalent, metallic bond; hybridization (sp, sp^2, sp^3, dsp^2, sp^3d, d^2sp^3, etc) Fajan's rules; VBT, LCAO, MO (qualitative idea on homo-/heteronuclear di-atomic molecules), VSEPR theory, Bent's rule, quadruple bond

3. Acids and Bases (5 lectures)

Different concepts: Arrhenius, Lewis, Bronsted, Usanovich Definition, Lux Theory; Hard and Soft Acids and Bases (HSAB); Chemistry in aqueous and nonaqueous solvents.

4. **Redox Chemistry** (**5 lectures**)

Nernst equation, standard/formal electrode potentials, influence of pH, Latimer/Forst/Pourbaix diagrams, redox indicator, disproportionation, comproportionation, Li and Li-ion battery.

5. Structural Chemistry (6 lectures)

Radius ratios and structures of some ionic compounds (NaCl, CsCl, ZnS), octahedral and tetrahedral holes, defects in ionic crystal lattice, Schottky defect, Frenkel defect, energetics of ionic crystals: Born-Haber cycle, Lattice energy, Born-Lande equation.

Reference Books:

1) Inorganic Chemistry-Principles of Structure and Reactivity. J. E. Huheey, E. A. Keiter, R. L. Keiter, 4th Edn. Harper-Collins, NY, 1993.
2) Inorganic Chemistry by Shriver and Atkins. International Student edition, fourth edition, Oxford University press 2008.
3) Inorganic Chemistry, Catherine E. Housecroft, Pearson; 5th edition 2018.
4) Inorganic Chemistry by G.L Miessler and Donald A Tarr, 5th edition, 2014.

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Reference books should be numbered as 1), 2), 3) …..
Please provide all bibliographic details for the reference books

5. **Lecture-wise break-up:**

Sl. No.	Topic	No. of lectures
1.	Atomic Structure and Periodic Properties	12
2.	Bonding and Structure	12
3.	Acids and Bases	05
4.	Redox Chemistry	05
5.	Structural Chemistry	06
	Total number of hours	40

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