M.Sc. Semester I - Chemistry

PAPER: CHEM **401**: INORGANIC CHEMISTRY - I

[CSIR- UGC - NET - TOPICS: 1(I), 2(I), 4(P), 5(I), 3(P)]

Total Credits – 3 **Total Hours - 45**

Objectives:

- To predict the chemical properties of an element based on its location in the periodic table whereas periodicity extends better understanding of interrelationship between elements, design of new classes of compounds, search and discovery of new elements.
- To understand the physical and chemical properties of a substance in terms of the structure and bonding of molecules which cannot exist without the bond between atoms.
- To confirm the common structures and predict the relative stabilities of metal complexes with different ligands which are essential in biochemical processes and have important applications as industrial catalysts in controlling reactivity.

Unit-1 Chemical periodicity

Fundamental Trends, First and Second Row - Anomalies, The use of p orbitals in Pi Bonding, The use (or no use) of d Orbitals by Non-metals, Reactivity and d Orbital Participation, Periodic Anomalies of the Non-metals and Post transition Metals.

Unit-2 Structure and bonding

Lewis structures: Octet rule, Resonance, VSEPR model. Valence bond theory: Hydrogen molecule, Homonuclear diatomic molecules, polyatomic molecules. Molecular orbital theory: An introduction to the theory, Homonuclear diatomic molecules, Heteronuclear diatomic molecules, Bond properties, polyatomic molecules, Molecular shape in terms of molecular orbitals. Structure and bond properties: Bond length, Bond strength, Electronegativity and bond enthalpy, Oxidation states.

Unit-3 Transition elements and coordination compounds

An Introduction to coordination compounds, IUPAC nomenclature of coordination compounds, Theories for metal-ligand bonding in complexes, Structure and Isomerism in coordination compounds, colour and electronic spectra, Magnetism, Stability of complexes and Reaction Mechanisms, Atomic structure and spectroscopy: Term symbols.

References:

1. Inorganic Chemistry Principles of Structure and Reactivity by James E. Huheey, Ellen A. Keiter, Richard L. Keiter, Okhil K. Mehdhi Fourth edition published by Pearson 2017.
2. Inorganic Chemistry by Shriver & Atkins' Fifth addition Published by Oxford University Pres, 2010.
3. Coordination Chemistry by Ajai kumar 6th edition published by Aaryush educations January, 2020.
4. Concise Inorganic Chemistry by J.D. Lee, Fifth Edition Published by Oxford University Press, 2008.
5. Chemistry of the Elements by N. N. Greenwood and A. Earnshaw Second Edition Published by Elsevier, 2012.