SYLLABUS

Maximum Marks: 30   **External: 20**

Time: 3 hours   **Internal: 10**

Note: The examiner is requested to set nine questions in all, selecting two questions from each section and one question i.e. Question No.1, based on entire syllabus will consist of short answer type. All questions carry equal marks. The candidate is required to attempt five questions in all selecting one from each section. Question No.1 is compulsory. Log table and nonprogrammable calculator is allowed.

UNIT-I

Periodic table and atomic properties

Atomic properties: atomic and ionic radii, ionisation energy, electron affinity and electronegativity definition, trend in periodic table, effective nuclear charge, Slater's rules.

UNIT-II

Ionic Solids

Stoichiometric and Non-stoichiometric defects in crystals, Lattice energy and Born- Haber cycle, Solvation energy and its relationship with solubility of Ionic solids, Polarizing power and Polarisability of ions, Fajan's rule.

UNIT- III

Structure and Bonding in Organic Compounds

Localized and delocalized chemical bond, Van der Waal's interactions, resonance: conditions and resonance effect, hyperconjugation, inductive effect, Electromeric effect & their comparison.

UNIT-IV

Gaseous State

Kinetic theory of gases, Calculation of root mean square velocity, average velocity, and most probable velocity. Collision diameter, collision number, collision frequency and mean free path (derivations excluded).

Text Books:

1.Jauhar, S.P.; Modern Approach to Inorganic Chemistry, Vol I, Modern Publishers
2. Sehgal, J.M.; Modern Approach to Organic Chemistry, Vol I, Modern Publishers
3. Dhawan, S.N.; Pradeep's Organic Chemistry, Vol I, Pradeep Publications

4. Kiran, S.; Kavya; Modern Approach to Physical Chemistry, Vol I, Modern Publishers
7. Kapoor, K.L. (2015), A Textbook of Physical Chemistry, Vol 1, 6 th Edition, McGraw HillEducation.
8. Bhasin K.K.; Pradeep's Inorganic Chemistry, Vol I, Pradeep Publications

Reference Books:
1. Lee, J.D.; (2010), Concise Inorganic Chemistry, Wiley India.
2. Clayden, J.; Greeves, N.; Warren, S. (2012), Organic Chemistry, Oxford.
3. Morrison, R. N.; Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd.
(Pearson Education).
4. Huheey, J.E.; Keiter, E.A.; Keiter; R. L.; Medhi, O.K. (2009),InorganicChemistry- Principles of Structure and Reactivity, Pearson ducation.

5. Atkins, P.W.; Paula, J.de. (2014),Atkin's Physical Chemistry Ed., 10th Edition, Oxford UniversityPress.

COURSE OBJECTIVES

The Course Objectives are given below

- To learn various periodic properties such as atomic/ionic radii, ionization energy, electron affinity, electronegativity.
- To study and calculate the effective nuclear charge.
- To have better understanding filling of various orbitals on the basis of Aufbau's principle and its justification on the basis of Slater's rule.
- To study various defects in solids
- To study lattice energy, salvation energy and relationship with solubility of ionic solids.
- To learn polarization and polarizability.
- To learn resonance, hyperconjugation inductive and electromeric effect.
- To have the knowledge of various types of velocities associated with gaseous molecules.

COURSE OUTCOMES

After the successful completion of the course, students will be able:

- To differentiate between electronegativity and electron affinity.
- To explain trends of various periodic properties.
- To calculate lattice energy of solids.
- To explain the characteristics of organic compounds based on resonance, hyperconjugation inductive effect.
- To explain the existence of weak intermolecular forces of attraction among gaseous molecules.
- To calculate various types of velocities associated with gaseous molecules.

LESSON PLAN

Week No	Scheduled Dates	Topics to be covered
1	**Feb 15, 2024**	Localized and delocalized chemical bond, Van der Waal's interactions, resonance: conditions and resonance effect
2	**Feb 22, 2024**	hyperconjugation, inductive effect, Electromeric effect & their comparison.
3	**Feb 29, 2024**	Atomic and ionic radii, ionisation energy
4	**Mar 7, 2024**	electron affinity, electronegativity definition, trend in periodic table
5	**Mar 14, 2024**	effective nuclear charge, Slater's rules
6	**Mar 21, 2024**	Kinetic theory of gases, Calculation of root mean square velocity
7	**Apr 4, 2024**	Calculation of average velocity, and most probable velocity. Collision diameter,
8	**Apr 18, 2024**	collision number, collision frequency and mean free path (derivations excluded)..
9	**Apr 25, 2024**	Stoichiometric and Non-stoichiometric defects in crystals,
10	**May 02, 2024**	Lattice energy and Born- Haber cycle
11	**May 09, 2024**	Solvation energy and its relationship with solubility of Ionic solids
12	**May 16, 2024**	Polarizing power and Polarisability of ions, Fajan's rule.