Course Outcomes
Department of Chemistry

1. Paper C-10:

This paper is aimed at building the fundamentals of chemistry in the students, with emphasis on atomic structure, bonding and periodic properties. It also focuses on giving the underlying principles required in various experiments from the C-101 lab. paper. The course outcomes are noted below. After completion of the paper the student will have a firm understanding of:

1. The structure of atom.
2. Chronological development from Thomson's model to Quantum Chemistry
3. Development of Quantum principles such as Plank's law, Uncertainty principle, Dual nature of matter
4. Schrödinger wave equation and its application in solving structure of hydrogen atom.
5. Shapes of orbitals and quantum numbers.
6. Electronic configuration and quantization of energy.
7. Periodic trends of IE, EA, electronegativity, atomic sizes and effective nuclear size.
8. Different types of bonding prevailing in compounds.
9. Concepts of ionic bonding, types of crystal lattices, lattice energy.
10. Concepts of covalent bonds, polarization, partial ionic & covalent character.
11. Metallic bonding, types of semiconductors and various weak forces.
12. Hydrogen bonding and its importance.
13. Principles of redox reaction and volumetric analysis for experiments.

2. Paper C-101 Lab:

This paper is aimed at giving the hands-on experience of handling apparatus for both inorganic and physical experiments and performing experiments with the concepts obtained from the relevant theory papers. The course outcomes are noted below. After completion of the paper the student will have a firm understanding of:

1. Calibration of apparatus for quantitative estimation.
2. Preparation of solutions of different Molarity/Normality of titrants.
3. Acid-base titration.
4. Redox titration.
5. Use of indicator.
6. Handling of viscometer & stalagmometer for viscosity & surface tension measurement.
7. pH metric titration of different acids & bases along with handling of pH meter.

3. Paper C-301:

This paper is aimed at giving in-depth knowledge on the non-transition elements. It also focuses on various application, exceptional cases as well specific bonding nature of various non-transition element-based compounds. The course outcomes are noted below. After completion of the paper the student will have a firm understanding of:

1. The elements of s and p block and their electronic configurations.
2. Inert pair effect, periodic trends of the properties of the elements.
3. Compounds of B, P, Si, N, S and their structural & bonding properties.
4. Compounds of Xe and structural as well as bonding properties.
5. Compounds of halogens and structural properties.
6. Inorganic polymers and applications & properties
7. Concepts of acids & bases
8. Various definition of acids & bases and trends
9. Pearson's HSAB principle
10. Principles of metallurgy and thermodynamics involved.

4. Paper C-301 Lab:

This paper focuses on inorganic preparations as well as quantitative estimation techniques of transition metal such as Cu using iodo/iodimetry. After completion of this paper the students would have gained knowledge on theories and practice of iodometry and iodimetric titrations. This would also help in knowing various methods of inorganic complex preparation, isolation and purification techniques as well as crystallization.

5. MM-401: Physical Chemistry-I:

This paper focuses on discussing thermodynamics and electrochemistry in depth with emphasis on applications and numericals solving: The outcomes of this paper is noted as below.After completion of this paper, the students would have been able to understand and apply:

1. The concepts of thermodynamics.
2. Various laws of thermodynamics, enthalpy, entropy and free energy.
3. Thermochemistry and its applications.
4. Gibbs' free energy and Helmholtz free energy, Maxwell relations.
5. Nernst heat theorem, absolute entropies.
6. Conductance and associated theories.
7. Trends in molar conductivities of weak and strong electrolytes.
8. Ionic mobilities, transference number.
9. Methods to calculate transport number.
10. Application of conductance measurements and their plots.
11. Concepts of electrolytic and electrochemical cells.
12. Faraday's law, redox potential, Nernst equation.
13. thermodynamics of electrolysis.
14. Various types of cells and electrodes.
15. Concept of potentiometric titration and plots.

6. MM- 503: Inorganic chemistry-II:

The main objective of this paper is to give an in-depth picture about organometallic compounds, structures, bonding and applications. The course outcomes are noted as below. At the end of the completion of this paper the students will have a better understanding of

1. Definition and types of organometallic compounds, 18 electron, EAN rules.
2. Structure & bonding properties, synergic interactions
3. Vaska complex, Wilkinson catalyst, ferrocene etc.
4. Types of metal-ligand bonding interactions.
5. Types of reactions shown by organometallic compounds
6. Catalysis.
7. Metal carbonyls and bonding with help of MOT & spectroscopy.
8. Metal nitrosyls, structure, bonding and properties.
9. Concepts of accuracy, precision and types of errors in estimation.
10. Concepts behind use of indicators in titration.
11. Various organic reagents used in inorganic analysis.
12. Solving competitive exam-based questions.

7. MM-504: inorganic Lab:

This paper focuses on use of experimental techniques for estimation of Ca(II), Mg(II), Cu(II) & Fe(II). Besides, it focuses on learning the techniques in finding hardness of water available in terms of Ca(II). After completion of this paper, the students would be able to estimate the above said metal ions using iodometry or complexometry methods.

8. MM-507: Symmetry & Quantum Theory:

This paper focuses on giving elaborate ideas about symmetry of molecules and group theory. The other part focuses on discussing basics & advanced concepts of quantum chemistry. At the end of this course the students would have gained the concepts regarding

1. Symmetry of molecules.
2. Point groups, group theory, character tables.
3. Reducible and irreducible representations and group multiplication table.
4. Concepts of quantum chemistry, development of Quantum principles such as Plank's law, Uncertainty principle, Dual nature of matter.
5. Schrödinger wave equation and its application in solving structure of hydrogen atom.
6. Shapes of orbitals and quantum numbers.
7. Theories of bonding from quantum perspectives, MOT & VBT
8. Concepts of atomic orbitals & molecular orbitals.

9. MM-508: Inorganic Lab:

Upon completion of this paper the students would have gained practical knowledge on quantitative estimation techniques such as gravimetry for estimation of metals such as Ni & Cu and analysis of sulphates and mixed oxides.