ALIGARH MUSLIM UNIVERSITY, ALIGARH

FACULTY OF SCIENCE

SYLLABUS FOR

M.SC. (CHEMISTRY)

Statistical treatment of analytical data; Solvent extraction; Chromatography: Principles, Instrumentation and applications of Gas, High performance liquid, Size exclusion, Ion, Ion exchange, Capillary electrophoresis; Spectrophotometry: Principles, Instrumentation and applications of UV-Visible, Fluorescence, Atomic absorption and emission; Titrimetric methods: Neutralization, Precipitation and Complexometric.

Atomic Structure, Periodic Properties, Chemical Bonding – Covalent Bond, Valence shell electron pair repulsion (VSEPR) theory, hybridization and shapes of molecules, Chemistry Transition metal elements, Coordination Compounds, Chemistry of Lanthanide and Actinides, theories of Acids and Bases, Hard and Soft Acids and Bases (HSAB) principle, Chemistry of Noble Gases, Valence bond & Crystal field Theories, Magnetic Properties of Transition Metal Complexes, Electronic Spectra of Transition Metal Complexes, crystal field splitting in tetrahedral, square pyramidal, trigonal bipyramidal and octahedral complexes, Mechanism of Substitution Reactions in Octahedral Transition Metal Complexes, Acid hydrolysis, Garrick SN1 conjugate base mechanism for base hydrolysis of octahedral complexes, Substitution reactions in square planar complexes, trans effect, Jahn-Teller effect, Term Symbols, Molecular orbital theory, p–bonding and M.O. theory, variation of Δo with p–acceptor σ–donor ligands, Racah Parameter, Nephelauxetic effect, charge transfer transitions, Bioinorganic Chemistry, iron-sulphur (Fe-S) proteins, ferredoxins and rubredoxins, metals in medicine.

Basic concepts, reactive intermediates and reaction mechanism (substitution, elimination, addition, oxidation and reduction). Stereochemistry of organic compounds. Aliphatic hydrocarbons (alkanes, alkenes, alkynes, dienes, and cycloalkanes). Arenes, aromaticity, haloalkanes and haloarenes.

Alcohols, ethers, and epoxides. Carbonyl compounds (aldehydes, ketones, carboxylic acids and its derivatives and amides). Amines and nitro compounds. Heterocyclic compounds, carbohydrates, amino acids and peptides. Name reactions, Pericyclic reactions and Introduction to spectroscopy.

Gaseous State, Solid State, Colloidal State, Solutions, Chemical Kinetics and Catalysis. Surface Chemistry. Thermodynamics, Chemical Equilibrium, Phase Equilibrium, Electrochemistry Quantum Chemistry, Rotational, Vibrational and Electronic Spectroscopy, Photochemistry, Physical Properties and Molecular Structure, Biophysical Chemistry.