

# **JSS COLLEGE FOR WOMEN, CHAMARAJANAGAR**

## **Department of Chemistry**

### **Programme and Course outcomes (NEP)**

#### **Programme outcomes:**

The students will be able to obtain the following knowledge and skill by the end of the programme

- To create enthusiasm among the students for chemistry and application in various fields of life.
- To provide students with broad and balanced knowledge and understanding of key concepts in chemistry.
- To develop in students a range of practical skills so that they can understand and assess risks and work safety measures to be followed in the laboratory.
- To develop in students the ability to apply standard methodology to the solution of problems in chemistry.
- To provide students with knowledge and skill towards employment or higher education in analytical chemistry or multi-disciplinary areas involving chemistry.
- To provide students with the ability to plan carry out experiments independently and assess the significance of outcomes and to cater to the demands of chemical industries of well- trained graduates.
- To develop in students the ability to adapt and apply methodology to the solution of unfamiliar types of problems.
- To instill critical awareness of advances at the forefront of chemical sciences, to prepare students effectively for professional employment or research degrees in chemical sciences and to develop an independent and responsible work ethics.

## **COURSE OUTCOME**

### **SEMESTER – I CHEMISTRY: I**

1. Understand the concepts of chemical analysis, accuracy, precision, errors and statistical data treatment
2. Learn about the basic laboratory practices, rules for fire prevention and precautions taken while handling toxic chemicals and using concentrated acids.
3. Know about Bohr's theory, de-Broglie's equations, Heisenberg uncertainty principle, Schrodinger's wave equation and quantum numbers and their significance.
4. Learn about the Radial and angular wave functions, Orbital shapes of s, p, d and f atomic orbitals, and electronic configurations of the elements.
5. Know about Pauli's exclusion principle, Hund's rule, Aufbau's principle and its limitation.
6. Understand the concept of basic organic chemistry, hybridisation, types of organic reactions, formation of hydrocarbons, ozonolysis and mechanism of  $E_1$ ,  $E_2$ ,  $E1cb$  reactions.
7. Learn about the Concept of aromaticity, bond properties, electron displacement effects, steric effect and their applications in explaining acidic strength of carboxylic acids and bases etc.
8. Understand the concept of gases and its conditions required for liquifaction of gases.
9. Know about the physical properties and chemical constituents of liquid state.

### **SEMESTER II : CHEMISTRY: II**

1. Understand the principles of titrimetric analysis, different types of titrations and indicators used and titration curves
2. Gain knowledge about balancing redox equations, titration curves, theory of redox indicators, gravimetric analysis and applications.
3. Understand the periodic table, classification and properties of s, p, d and f block elements.
4. Understand different scales for the measurement of electro-negativity and factors affecting it and chemistry of the hydrides, carbides, oxides and halides of group 13 to 17.
5. Understand nucleophilic substitution at saturated carbon, energy profile diagram, stereochemistry and factors affecting  $SN_1$  and  $SN_2$  reactions.
6. Learn about Aromatic electrophilic substitution reactions like nitration, sulphonation, Friedel-Crafts reactions etc.
7. Understand the concept of liquid crystals and their applications and classification with examples.
8. Understand the different forms of solids, laws of crystallography, miller indices and its calculation, X-ray diffraction studies. Bragg's law and its equation.
9. Know about the principles, factors and validity of distribution law.

### **SEMESTER III : CHEMISTRY: III**

1. Understand the concept of fundamentals of chromatography principles and applications of chromatography.
2. Know about the properties of structure and bonding of ionic, covalent, Lewis, Sidgwick - Powell and VSEPR theory.
3. Learn about Born-Landé equation, Born-Haber cycle and Kapustinskii equation
4. Learn about the generation, structure, stability and reaction mechanism of reaction intermediates.
5. Learn about the methods for identifying reaction mechanisms.
6. Apply the theory about chemical kinetics and determine the velocity constants of various reactions.
7. Able to understand the principles of electrochemistry and its applications of conductance measurements and conductometric titrations.

### **SEMESTER IV : CHEMISTRY: IV**

1. Understand the principle, instrumentation and applications of spectrophotometry, nephelometry and turbidometry will be taught.
2. Know about the properties of structure and bonding in metals from their compounds.
3. Learn about the concept of MOT, and molecular orbital energy diagrams for homonuclear and heteronuclear diatomic molecules.
4. Understand the concept & types of stereochemistry and prediction of various projection formulae of chiral molecules.
5. Know about the theory and concept of Cis-, Trans- isomerism and techniques of designating the molecules in to R, S, D & L will be taught taking proper examples. .
6. Learn about the important laws of thermodynamics and their applications to various thermodynamic systems.
7. Understand adsorption processes and their mechanisms and the function and purpose of a catalyst.
8. Apply adsorption as a versatile method for waste water purification.

### **SEMESTER-V : CHEMISTRY -PAPER V**

1. Learn about Classification of ligands and the theories of structure, bonding, stability and application of co-ordination complexes.
2. Know about the isomerism in coordination complexes.
3. Capable of understand the terms related to stereochemistry like chirality, prochirality and conformational analysis.
4. Learn about the classification, structural elucidation, synthesis and biological importance of vitamins.
5. Understand the laws of photochemistry and photophysical processes
6. Understand the concept of radiation Chemistry.
7. Learn about phase equilibria.
8. Capable of understanding the concept, principle, selection rule and energy levels of rotational, vibrational, Raman and electronic spectroscopy.

### **SEMESTER-V : CHEMISTRY -PAPER VI**

1. Learn about non-aqueous solvents and HSAB concept
2. Know about structure and bonding in M-M bond and metal atom clusters.
3. Learn about classification and synthesis of heterocyclic compounds.
4. Capable of understand the ring structure, structural formulae, conformational analysis and reactions of carbohydrates.
5. Know about the concept and types of colligative properties.
6. Learn about elementary quantum mechanics.
7. Capable of understanding the concept and instrumentation, absorption intensity and maxima of UV spectroscopy.
8. Able to Understand the wood word -Fischer rules for calculation of absorption maxima of different compounds.

## **SEMESTER-VI : CHEMISTRY -PAPER VII**

1. Understand the types of metal ligand bonding in coordination complexes like VBT, CFT.
2. Know about the magnetic properties of coordination compounds.
3. Capable of understand the aromatic electrophilic and nucleophilic substitution reactions
4. Able to understand the mechanism of addition and elimination reactions.
5. Understand the concept of ionic equilibria
6. Know about the construction, working and cell reaction of electrochemical cell, reference electrodes and applications of EMF measurements.
7. Capable of understanding the principle, vibration frequencies & finger print region of IR spectroscopy.
8. Predict the position of IR absorption frequency of different compounds.
9. Know about the changes in infrared spectra of donor molecules upon coordination complexes.

## **SEMESTER-VI : CHEMISTRY -PAPER VIII**

1. Understand the types, manufacturing process and applications of paints, propellants, abrasives, refractories, ceramics, explosives, fertilizers and silicates.
2. Learn about the properties, preparation and applications of nanotechnology, carbon nanotubes and nanowires
3. Learn about the reaction and mechanism of different rearrangements.
4. Able to understand the synthesis and reactions of amino acids and peptides
5. Learn about the concept of kinetics of homogeneous catalysis and fast reactions and their techniques.
6. Know about the concept of chemical dynamics and complex reactions
7. Capable of understanding the concept, instrumentation and chemical shift of nuclear magnetic resonance spectroscopy.
8. Interpretation of proton NMR spectra of different compounds.