

BACHELOR OF SCIENCE IN CHEMISTRY
COURSE OF VSK UNIVERSITY
FIRST SEMESTER

Code : **CHT-101**

Univ Code :101

Contact Hours :54

Work load : 4 hours per week

Credit Points :

Evaluation: Continuous Internal Assessment - 30 Marks
Semester End Examination - 70 Marks

PAPER-1

UNIT-I: INORGANIC CHEMISTRY-1

18 Hours

Atomic structure 06 hours Wave-mechanical model- Schrodinger wave equation (no derivation), explanation of the various terms, application of Schrodinger wave equation to H-atom & physical significance of ψ & ψ^2 . Main conditions which ψ must satisfy to give meaningful solution (Eigen function). Quantum numbers n, l, m & s, radial and angular wave functions and probability distribution curves, shapes of s, p & d orbitals. Pauli exclusion principle. Hund's rule of maximum multiplicity, Aufbau principle & (n+1) rule. Energy level diagram, electronic configurations of elements.

Periodic properties

06 hours

Atomic & ionic radii, ionization energy, electron affinity and electronegativity – definition, methods of determination or evaluation, trends in periodic table and application in predicting and explaining the chemical behavior. Effective nuclear charge and Slater rules

Chemical bonding-1

06 hours

Definition, types of chemical bonds, Ionic bond-formation, factors favoring the formation of ionic bond, Characteristics of ionic compounds, radius ratio rule. structure of ionic crystals: MX (ZnS) & MX₂(TiO₂), lattice energy, Born-Haber's cycle, Born-Landé equation (no derivation), consequences of lattice energy, Polarization of ions (Fajan's rules)

UNIT-II:ORGANIC CHEMISTRY-1

18 Hours

Structure and bonding in organic molecules 06 hours

Causes of bond formation, types of bonds: ionic, covalent and coordinate – definition with examples. Bond length, bond angle, bond energy and bond order – definition with examples. Hybridization in carbon – definition. Explanation of sp³, sp², sp hybridizations by taking methane, ethylene and acetylene molecules respectively, sigma and pi bonds-definition & examples.

Organic reactions and their mechanism

06 Hours

Types of organic reactions: Substitution, addition, elimination, rearrangement, hydrolysis, oxidation, reduction, reactions – definition with examples. Types of bond cleavage: Homolytic & heterolytic fission – definition with examples. Types of reagents: Electrophiles and nucleophiles – definition with examples.

Reactive intermediates: Carbonium ions, carbanions – definition, methods of generation and stability. Free radicals and carbenes – definition with examples. Types of reaction mechanisms (Ionic and free radical mechanisms).

Stereochemistry of organic reactions

06 Hours

Concept of isomerism and types. Optical isomerism, Optical activity, chiral carbon, and molecular dissymmetry. Elements of symmetry: plane of symmetry, and center of symmetry. Optical isomerism in tartaric acid. Enantiomers, diastereomers, meso compound, racemic mixture – meaning & examples.

Geometrical isomerism: definition with examples (maleic & fumaric acids) E-Z nomenclature with examples

Conformation isomers: Definition with examples. Conformational analysis of ethane.

UNIT-III: PHYSICAL CHEMISTRY-1

18 Hours

Gaseous state 08 hours

Critical phenomenon, PV-isotherms of real gases, continuity of states, the isotherms of carbon dioxide, relation between critical constants and Vanderwaal's constants. The law of corresponding states and reduced equation of states. Molecular velocities; root mean square velocity, average velocity and most probable velocity. Qualitative discussion of Maxwell and Boltzmann's distribution of molecular velocities, collision number and mean free path.

Physical properties of liquids

05 Hours

Surface tension and its determination by using stalagmometer. Viscosity and its determination by using Ostwald's viscometer. Effect of temperature on viscosity and surface tension. Refractive index, specific & molar refractivities. Additive and constitutive properties. Application of parachor and molar refractivity in elucidating the structure of benzene and quinone.

Solid state

05 Hours

Difference between crystalline and amorphous solids. Laws of crystallography (definition explanation). Symmetry elements. Crystal lattice and unit cell, Bravais lattice, Miller indices. Derivation of Bragg's equation.

Code : **CHP-101**

Univ Code :101

Contact Hours :84

Work load : 4 hours per week

Credit Points :

Evaluation: Continuous Internal Assessment - 10 marks

Semester and Examination - 40 marks (30 marks for examination,

05 marks for Practical record and 05 marks for viva-voce)

LABORATORY COURSE-1

84 Hours

Titrimetric estimations

- **Two practical durations should be used for instructions on theory & principles of titrimetric estimations and demonstration of any one estimation.**
- **Minimum 18 experiments are to be given for estimation.**

1. Preparation of standard sodium carbonate solution, standardization of HCl and estimation of sodium hydroxide solution.
2. Estimation of sodium hydroxide and sodium carbonate in a mixture of the two.
3. Estimation of oxalic acid and sulphuric acid in a mixture of the two using standard potassium permanganate and standard sodium hydroxide solution.
4. Preparation of standard oxalic solution, standardization of potassium permanganate and estimation of Fe in Mohr's salt.
5. Estimation of calcium content in lime stone as calcium oxalate by standardized potassium permanganate solution.
6. Estimation of ferrous & ferric iron in a mixture of the two by dichromate method.
7. Preparation of standard potassium dichromate solution, standardization of sodium thiosulphate solution and estimation of copper in copper sulphate.

8. Preparation of standard ferrous ammonium sulphate, standardization of potassium dichromate solution and estimation of Fe in FeCl_3 .
9. Estimation of hardness of water by EDTA method.
10. Estimation of Zn in Zinc sulphate solution by EDTA method.
11. Determination of alkali content in antacid tablet
12. Estimation of phenol/aniline by bromination method.
13. Estimation of water soluble carboxylic acid-titration method.
14. Estimation of glucose by titrimetry method.
15. Estimation of vitamin C by titrimetry method.
16. Estimation of amino acid.
17. Estimation of aldehyde and ketone.
18. Determination of percentage of hydroxyl groups by acetylation methods.
19. Estimation of amines by acetylation methods.
20. Determination of saponification value of an oil or fat.
21. Determination of dissolved oxygen (DO) in water sample.

Spectrophotometric estimations

22. Estimation of carbohydrate by spectrophotometric method
23. Estimation of aminoacids using ninhydrin method
24. Estimation of protein by Biuret method