**B. Sc. Ist Year ( Ist Semester)**

**Paper-I (CH-101) Inorganic Chemistry (Theory)**

**M. Marks: 32** **Time: 3 Hrs.**

Note: Nine questions will be set. **Q. No. 1,** based on whole syllabus, is compulsory. There will be four questions from section A **and** four from section **B** . Candidates will be required to attempt five questions in all, selecting at least two questions from each section. Question no. 1 carry 8 marks and all questions in Section A & B ( not more than 2 - 3 parts) carry 6 marks each .

## Section – A (23 periods)

### Atomic Structure

Idea of de Broglie matter waves, Heisenberg's uncertainty principle, atomic orbitals, quantum numbers, radial and angular wave functions, normal and orthogonal wave functions, significance of $\Psi$ and $\Psi^2$, probability distribution curves, shapes of s, p, d, f orbitals, Aufbau and Pauli exclusion principles, Hund's multiplicity rules, Electronic configuration of elements, effective nuclear charge, Slater's rules.

### Periodic table and atomic properties

Classification of periodic table into s, p, d, f blocks, atomic and ionic radii, ionization energy, electron affinity and electronegativity definition, methods of determination or evaluation, trend in periodic table (in s and p-block elements), Pauling , Mulliken, Allred Rachow and Mulliken Jaffe's electronegativity scale, Sanderson's electron density ratio.

## Section – B (22 periods)

### Covalent Bond

Valence bond theory (Heitler-London and Pauling approach) and its limitation, directional characteristics of covalent bond, various type of hybridization and shapes of simple inorganic molecules and ions ($BeF_2$, $BF_3$, $CH_4$, $PF_5$, $SF_6$, $IF_7$, $SO_4^{-2}$, $ClO_4^{-1}$, $NO_3^{-1}$) valence shell electron pair repulsion (VSEPR) theory to $NH_3$, $H_3O^+$, $SF_4$, $ClF_3$, $H_2O$, $SnCl_2$, $ClO_3^{-1}$ and $ICl_2^{-1}$. Molecular orbital theory of homonuclear ($N_2$, $O_2$) heteronuclear (CO and NO) diatomic molecules and ions, bond energy, bond angle, bond length and dipole moments, percentage ionic character from dipole moment and electronegativity difference.

**Ionic Solids**

Ionic structures (NaCl, CsCl, ZnS (Zinc blende), $CaF_2$) size effects, radius ratio rule and its limitations, Madelung constant, Stoichiometric and Non stoichiometric defects in crystals, Lattice energy (mathematical derivation excluded) and Born-Haber cycle, Solvation energy and its relation with solubility of Ionic solids, Polarizing power and Polarisability of ions, Fajan's rule.