

# FIRST YEAR SCIENCE

## CHEMISTRY

The examination shall consist of three theory papers and one practical.

<u>Paper &amp; Course</u>	<u>Hrs/week</u>	<u>M. Marks</u>
Paper -I Inorganic Chemistry	2	50
Paper- II Organic Chemistry	2	50
Paper- III Physical Chemistry	2	50
Practical	4	50

### Paper I

### Inorganic Chemistry

Time-3 Hrs.

M.M. 50

**NOTE:** The paper will be divided into **THREE** sections.

Section-A Ten questions (short type answer) two from each Unit will be asked. Each question will be of half mark and the candidates are required to attempt all questions.

**Total 5 marks**

Section-B Five questions (answer not exceeding 250 words) one from each Unit with internal choice will be asked and the candidates

are required to attempt all questions. Each question will be of 5 marks.

**Total 25 marks**

Section-C Four questions may be in parts covering all the five Units (answer not exceeding 500 words) will be asked. The candidates are required to attempt any **TWO** questions. Each question will be of 10 marks.

**Total 20 marks**

### UNIT - I

**Covalent Bond**- Valence bond theory and its limitations, directional characteristics of covalent bond, various types of hybridization and shapes of simple inorganic molecules and ions. Valence Shell Electron Pair Repulsion (VSEPR) theory, regular and deviation from regular geometry. MO theory, homonuclear and heteronuclear (CO, NO, HF and HCl) diatomic molecules, multicenter bonding in electron deficient molecules, bond strength and bond energy, percentage ionic character from dipole moment and electronegativity difference.

**Ionic Solids** - Ionic structures, radius ratio effect and coordination number, limitation of radius ratio rule, lattice defects, semiconductors, lattice energy and Born-Haber cycle, solvation energy and solubility of ionic solids, polarizing power and polarisability of ions, Fajan's rule. Metallic bond - free electron, valence bond and band theories.

**Weak Interactions-** Hydrogen bonding, Van der Waals forces.

## UNIT II

**s -Block Elements** - Comparative study, diagonal relationships, salient features of hydrides, solvation and complexation tendencies including their function in biosystems, an introduction to metal alkyls and aryls.

**Chemistry of Noble Gases**-History of discovery, separation of inert gases, chemical properties of the noble gases, chemistry of xenon, structure and bonding in xenon compounds.

## UNIT -III

**Group-13**- General properties, oxides, hydroxide, halides and hydrides of boron, diborane and higher boranes, borohydrides, borazine, oxyacids of boron, borax and borax bead test .

**Group-14** - General properties, inert pair effect, halides, oxides, silicates, silicones, graphitic compounds, carbides, cyanides and carbonyls, brief idea of fullerenes.

**Group-15**- General properties, hydrides, azides, halides, oxides and oxyacids of phosphorous, nitrogen fixation, fertilizers.

## UNIT - IV

**Group-16** - General properties, polymorphism, hydrides, halides, oxides and oxyacids of sulphur, thiosulphuric

acid and salts, thionic acids and their salts, tetrasulphur tetranitride.

**Group-17** - General properties, hydrogen halides, oxides and oxyacids of halogens, interhalogen compounds, polyhalides, basic properties of halogens.

## UNIT - V

**Non -Aqueous Solvents** - Physical properties of a solvent, types of solvents and their general characteristics, Differentiating and leveling solvents, reactions in non-aqueous solvents with special reference to liquid  $\text{NH}_3$  and liquid  $\text{SO}_2$ .

**Acids and Bases** - Arrhenius, Bronsted - Lowry, Lux - Flood, solvent system and Lewis concepts of acid and bases, Usanovitch definition.

### Books Recommended

1. Concise Inorganic Chemistry: J. D. Lee
2. General Inorganic Chemistry: J. A. Duffy, Longman (2nd Ed.)
3. Principles of Inorganic Chemistry: B. R. Puri and L. R. Sharma
4. Basic Inorganic Chemistry: F.A.Cotton and G. Wilkinson, Wiley Eastern
5. Molecular Geometry : R. J. Gillespie, Van Nostrand Reinhold.
6. Inorganic Chemistry (Hindi ed.): Suresh Ameta, A. Sharma and M. Mehta, Himanshu Pub.