

## **CHEMISTRY**

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

<b><u>Paper &amp; Course</u></b>	<b><u>Hrs/week</u></b>	<b><u>M. Marks</u></b>
Paper -I Inorganic Chemistry	2	50
Paper- II Organic Chemistry	2	50
Paper- III Physical Chemistry	2	50
Practical	4	75

### **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

#### **Chemistry of Elements of First Transition Series -**

Characteristic properties of d-block elements (colour, variable valency, magnetic and catalytic properties and ability to form complexes). Properties of the elements of the first transition series, their binary compounds and complexes illustrating relative stability of their oxidation states, coordination number and geometry.

**Chemistry of Elements of Second and Third Transition Series -** General characteristics, comparative treatment with their 3d-analogues in respect of ionic radii, oxidation states, magnetic behavior, spectral properties and stereochemistry.

### UNIT II

**Oxidation and Reduction -** Use of redox potential data, analysis of redox cycle, redox stability in water - Frost, Latimer and Pourbaix diagrams, principles involved in the extraction of the elements.

**Coordination Compounds -** Werner's coordination theory and its experimental verification, effective atomic number concept, nomenclature of coordination compounds, isomerism in coordination compounds.

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valence bond theory of transition metal complexes, chelate and chelate effects.

### UNIT- III

**Chemistry of Lanthanides -** Electronic structure, oxidation states and ionic radii, lanthanide contraction, complex formation, occurrence and isolation, lanthanide compounds.

**Chemistry of Actinides -** General feature and chemistry of actinides, chemistry of separation of Np, Pu and Am from U, similarities between the later actinides and the later lanthanides

### UNIT- IV

**Gravimetric Analysis-** Principles, solubility, formation and preparation of precipitation, colloidal properties, ageing and contamination of the precipitates, coprecipitation and post-precipitation.

**Simple Organic Reagents used in Inorganic Analysis- 8-** Hydroxyquinoline, Dimethylglyoxime,  $\alpha$ -nitroso- $\beta$ -naphthol, Anthranilic acid, Arsonic acids, Cupron and Cupferron.

### UNIT- V

**Chromatography -** Basic principles, instrumentation and application of adsorption, and partition chromatography, ion exchange separation.

**Errors in Quantitative Analysis -** Accuracy and precision, determinate, indeterminate and accidental errors, precision of a single measurement, precision of mean.

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rejection of a result, errors in a derived result, methods of checking the accuracy of analysis, significant figures, computation values.

**Book Recommended:**

1. Text Book of Quantitative Inorganic Analysis: A. I. Vogel (Chapter- I, II and XXIII).
2. Text Book of Quantitative Inorganic Analysis: I. M. Kolthoff and E. R. Sandell.
3. Concise Inorganic Chemistry: J. D. Lee.
4. General Inorganic Chemistry: J. A. Duffy.
5. Principle of Inorganic Chemistry: B. R. Puri and L. R. Sharma.
6. Basic Inorganic Chemistry: Cotton and Wilkinson and Gaus, Willey.
7. Inorganic Chemistry (Hindi ed.): Suresh Ameta, A. Sharma and M. Mehta, Himanshu Pub.