

**Government P G College, Ambala Cantt**  
**Course File (Session 2023-24)**  
**Name of Associate Professor: Dr. Deepak Sharma**  
**Class: BSC-II/3<sup>rd</sup> Semester/Non Medical and Medical**  
**Paper code and Name: CHE-201/ Inorganic Chemistry**

**SYLLABUS**

**Maximum Marks: 33 (External)**  
**08 (Internal)**

**Time: 3 hours**

**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. The candidate is required to attempt five questions in all selecting two questions from each section.

**SECTION-A**

**Chemistry of d-Block elements**

Definition of transition elements, position in the periodic table, General characteristic properties of d-Block elements. Comparison of properties of 3d elements with 4d and 5d elements with reference only to ionic radii, oxidation state, magnetic and spectral properties and stereochemistry. Stability of various oxidation states and e.m.f (Latimer and Frost diagrams). Structure and properties of some compounds of transition elements-  $\text{TiO}_2$ ,  $\text{VOCl}_2$ ,  $\text{FeCl}_3$ ,  $\text{CuCl}_2$  and  $\text{Ni}(\text{CO})_4$

**SECTION-B**

**Coordination Compounds**

Werner's theory of coordination compounds, effective atomic number, chelates, nomenclature of coordination compounds, Isomerism in coordination compounds, valence bond theory of transition metal complexes

**Non-aqueous solvents**

Physical properties of solvents types of solvents and their general characteristics, reactions in non aqueous solvents with reference to liquid  $\text{NH}_3$ , liquid  $\text{SO}_2$

**Text Books:**

1. Jauhar, S.P.; Modern Approach to Inorganic Chemistry, Vol II, Modern Publishers
2. Bhasin, K.K.; Pradeep's Inorganic Chemistry, Vol II, Pradeep Publications

**Reference Books:**

1. Lee, J.D.; (2010), Concise Inorganic Chemistry, Wiley India.
2. Huheey, J.E.; Keiter, E.A.; Keiter, R. L.; Medhi, O.K. (2009), Inorganic Chemistry- Principles of Structure and Reactivity, Pearson Education.

## **COURSE OBJECTIVES**

**The Course Objectives are given below**

- To have knowledge regarding the position of d-block elements.
- To know the reducing/oxidizing capabilities of various metals.
- To have better understanding regarding the comparison of 3d series with 4d and 5d series in reference to ionic radii, oxidation state, magnetic and spectral properties, stereochemistry
- To study structure and properties of some compounds of transition elements
- To know about the basic concepts such as EAN, IUPAC Nomenclature, isomerism, chelation in relation to coordination compounds.
- To have better understanding of geometry, magnetic properties of coordination compounds with reference to VBT
- To have the knowledge of Non-aqueous solvents and comparison of their behavior with aqueous medium

## **COURSE OUTCOMES**

**After the successful completion of the course, students will be able:**

- To distinct various transition elements from s-block and p-block elements.
- To guess the fate of reaction depending upon the reducing/oxidizing capabilities of various metals.
- To understand and can differentiate ferromagnetism, anti-ferromagnetism and ferri-magnetism.
- To understand and can justify the applicability of interstitial compounds in industries.
- To justify the catalytic properties of transition elements for various reactions
- To analyze the geometry and magnetic properties of various coordination complexes.
- To understand the wide applicability of complexes in industrial and metallurgical processes as well as in medicines.
- To understand the various advantages and disadvantages of Non aqueous solvents over aqueous solvents.

## LESSON PLAN

Week No	Scheduled Dates	Topics to be covered
<b>1</b>	<b>July 24, 2023</b> July 29, 2023	Definition of transition elements, position in the periodic table, General characteristic properties of d-Block elements
<b>2</b>	<b>July 31, 2023</b> Aug 05, 2023	Comparison of properties of 3d elements with 4d and 5d elements with reference only to ionic radii, oxidation state
<b>3</b>	<b>Aug 07, 2023</b> Aug 12, 2023	Comparison of properties of 3d elements with 4d and 5d elements with reference only to magnetic and spectral properties and stereo chemistry
<b>4</b>	<b>Aug 14, 2023</b> Aug 19, 2023	Stability of various oxidation states and e.m.f (Latimer and Frost diagrams)
<b>5</b>	<b>Aug 21, 2023</b> Aug 26, 2023	Structure and properties of some compounds of transition elements- $\text{TiO}_2$ , $\text{VOCl}_2$ , $\text{FeCl}_3$
<b>6</b>	<b>Aug 28, 2023</b> Sept 02, 2023	Structure and properties of some compounds of transition elements- $\text{CuCl}_2$ and $\text{Ni}(\text{CO})_4$ .
<b>7</b>	<b>Sept 04, 2023</b> Sept 09, 2023	Werner's theory of coordination compounds
<b>8</b>	<b>Sept 11, 2023</b> Sept 16, 2023	effective atomic number, chelates, nomenclature of coordination compounds
<b>9</b>	<b>Sept 18, 2023</b> Sept 23, 2023	effective atomic number, chelates, nomenclature of coordination compounds
<b>10</b>	<b>Sept 25, 2023</b> Sept 30, 2023	Isomerism in coordination compounds
<b>11</b>	<b>Oct 02, 2023</b> Oct 07, 2023	valence bond theory of transition metal complexes

<b>12</b>	<b>Oct 09, 2023</b> Oct 14, 2023	valence bond theory of transition metal complexes
<b>13</b>	<b>Oct 16, 2023</b> Oct 21, 2023	Non-aqueous solvents Physical properties of solvents types of solvents and their general characteristics
<b>14</b>	<b>Oct 23, 2023</b> Oct 28, 2023	Physical properties of solvents types of solvents and their general characteristics
<b>15</b>	<b>Oct 30, 2023</b> Nov 04, 2023	reactions in non aqueous solvents with reference to liquid NH <sub>3</sub>
<b>16</b>	<b>Nov 13, 2023</b> Nov 18, 2023	reactions in non aqueous solvents with reference to liquid SO <sub>2</sub>