TEACHING PLAN: CH-202

SCHOOL: SOBAS		ACADEMIC SESSION: 2023-2024	FOR STUDENTS' BATCH: IV SEMESTER
1	Course code	CH-202	
2	Course Title	INORGANIC CHEMISTRY (COORDINATION CHEMISTRY)	
3	Credits		
4	Learning Hours	Contact Hours: 54 Practical Teaching: 27 Project, Tutorial and Assessment: 09 Total hours: 90	
5	Course Objective	The purpose of this course is to provide: 1. Broad and balance knowledge in chemistry in addition to understanding of key chemical concepts, principles and theories. 2. To develop students' ability and skill to acquire expertise over solving both theoretical and applied chemistry problems. 3. To provide knowledge and skill to the students' thus enabling them to undertake further studies in chemistry in related areas or multidisciplinary areas that can be helpful for self-employment/entrepreneurship.	
6	Course Outcomes	1. Have good knowledge about d-block elements particularly of transition elements. 2. To study the bonding of 3d elements. To recapitulate the concept of valence bond theory and know the concept of crystal field theory with reference to splitting of d orbital's in octahedral, tetrahedral and square planar complexes and factors affecting the crystal field parameters. Able to calculate the spectroscopic terms for various metal ions. 3. To study the comparison between 3d elements with 4d and 5d elements with reference to ionic radii, oxidation state, magnetic properties and spectral properties some compounds of transition elements. 4. To know about position of f block elements in periodic table and their general characteristics. To study the occurrence and separation of lanthanides and lanthanide compounds. Have knowledge of actinides their existence and general properties. 5. To explain the factors responsible for the stability of coordination complexes and various substitution reactions of square planar complexes with reference to trans effect.	
7	Outline syllabus:		

7.01	Paper Code	Unit	Introduction	Reference number	Teaching methods
7.02	CH-202 UNIT-I WERNER'S THEORY	(a)	Bonding in Transition metal Complexes	J.D. Lee Puri, Sharma, Kalia James E. Huheey	Lecture, Blackboard, PPT, Discussion
		(b)	Crystal Field Theory	J.D. Lee Puri, Sharma, Kalia James E. Huheey	Lecture, Blackboard, PPT, Discussion
		(c)	Structure in Transition metal Complexes	J.D. Lee Puri, Sharma, Kalia James E. Huheey	Lecture, Blackboard, PPT, Discussion

7.03	**CH-202 UNIT-II TRANSITIONAL ELEMENTS**	(a)	General Group trends	J.D. Lee Puri, Sharma, Kalia	Lecture, Blackboard, PPT, Discussion
		(b)	Chemical Properties	J.D. Lee Puri, Sharma, Kalia	Lecture, Blackboard, PPT, Discussion
		(c)	Chemistry of Various Oxidation States	J.D. Lee Puri, Sharma, Kalia	Lecture, Blackboard, PPT, Discussion
7.04	**CH-202 UNIT-III LANTHANOIDS AND ACTINOIDS**	(a)	Electronic Configuration	J.D. Lee Puri, Sharma, Kalia	Lecture, Blackboard, PPT, Discussion
		(b)	Properties	J.D. Lee Puri, Sharma, Kalia	Lecture, Blackboard, PPT, Discussion
		(c)	Separation of Lanthanides	J.D. Lee Puri, Sharma, Kalia	Lecture, Blackboard, PPT, Discussion
7.05	**CH-202 UNIT-IV INORGANIC REACTION MECHANISM**	(a)	Introduction to inorganic reaction mechanism	J.D. Lee Puri, Sharma, Kalia James E. Huheey Douglas, McDaniel and Alexander	Lecture, Blackboard, PPT, Discussion
		(b)	Substitution Reaction	J.D. Lee Puri, Sharma, Kalia James E. Huheey Douglas, McDaniel and Alexander	Lecture, Blackboard, PPT, Discussion
		(c)	Thermodynamic and Kinetic Stability	J.D. Lee Puri, Sharma, Kalia James E. Huheey Douglas, McDaniel and Alexander	Lecture, Blackboard, PPT, Discussion

8	**Course Evaluation**	
8.10	**CA: 20%**	
8.1	**Attendance**	5%
8.12	**Homework**	-
8.13	**Quizzes**	4 Quizzes, 5%
8.14	**Projects**	1 Project, 5%
8.15	**Presentation**	1 Presentation, 5%
8.16	**Any other**	--
8.2	**MTE(IA)**	20%
8.3	**End-term examination: 60%**	
9	**Text Books & References**	
9.1	**Text books**	Inorganic Chemistry: Principles of Structure and Reactivity: James E. Huheey Principles of Inorganic Chemistry: Puri, Sharma, Kalia
9.2	**References**	Concise Inorganic Chemistry: J.D. Lee Principles of Inorganic Chemistry: Puri, Sharma, Kalia Inorganic Chemistry: Principles of Structure and Reactivity: James E. Huheey

		Concepts and Models of Inorganic Chemistry: Douglas, McDaniel and Alexander
9.3	**Video References**	https://www.youtube.com/watch?v=b7veCCCood0 https://www.youtube.com/watch?v=664YicsoYkg https://www.youtube.com/watch?v=k8tYXDKb2yE https://www.youtube.com/watch?v=4Yetd0QlRTo https://www.youtube.com/watch?v=MqJiz_zKnjk https://www.youtube.com/watch?v=pQiZ0UWlg4w https://www.youtube.com/watch?v=qNaBMvJXdJ4 https://www.youtube.com/watch?v=aU6MPFdyjmo https://www.youtube.com/watch?v=yW_C10cEzMk

Mapping of Outcomes v. Topics

Outcome no. → Syllabus topic↓	1	2	3	4	5
Paper Code.Unit I (a)	Y				
Paper Code. Unit I (b)	Y				
Paper Code. Unit I (c)	Y				
Paper Code.Unit II (a)		Y	Y		
Paper Code. Unit II(b)		Y	Y		
Paper Code. Unit II(c)		Y	Y		
Paper Code.Unit III (a)				Y	
Paper Code. Unit III(b)				Y	
Paper Code. Unit III(c)				Y	
Paper Code.Unit IV (a)					Y
Paper Code. Unit IV(b)					Y
Paper Code. Unit IV(c)					Y

QUESTION BANK

Subjective type

UNIT I

1. What are Coordination compounds?
2. How ligands are classified? Explain with example.
3. Define chelating ligands and chelates with example.
4. Discuss Werner's theory of Coordination complexes.
5. Name the different kinds of isomerism in Coordination complexes.
6. What is Metallic Bonding?
7. What is meant by coordination number?
8. Discuss the geometries adopted by complexes with coordination number from 2 to 6.
9. What are the basic postulates of VBT? Discuss the limitations of this theory.
10. What is Crystal Field Theory?
11. How does CFT explains the colour of coordination complexes?
12. Discuss the splitting of d-orbitals in different geometries.

UNIT II

1. What are d-block elements? How are they subdivided in the various series?
2. Explain: Most of the transition metals are paramagnetic.
3. Explain: Iron, Cobalt and Nickel are ferromagnetic.
4. Explain: All transition metals show variable valency.
5. What are the various oxidation states of V? How would you account for them?

UNIT III

1. Discuss the electronic configurations and the oxidation states of lanthanoids.
2. How do lanthanoids occur in nature?
3. What is lanthanoid contraction? How would you account for this?
4. What are actinoids?
5. How is Uranium extracted from its ores?
6. What are the consequences for lanthanide contraction?
7. How does thorium occur in nature? How is the metal extracted from monazite sand?

UNIT IV

1. What are inert and labile complexes?
2. Show that inertness of a complex is different from its thermodynamic stability.
3. Discuss the neucleophilic substitution reaction in octahedral complexes.
4. Discuss the electron transfer reaction mechanism in coordination complexes with suitable examples.
5. What is an inert ligand?
6. Discuss the mechanism of aquation of cis and trans $[Co(en)_2Cl(OH)]^+$ complexes.

PROJECTS (To be given to group of students)
