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SCHOOL OF CHEMICAL & LIFE SCIENCES
M.SC. CHEMISTRY
SEMESTER-II EXAMINATION-2023
PAPER TITLE: INORGANIC CHEMISTRY-II
PAPER CODE: MCHCC – 203

Time 2 Hours

Maximum Marks 60

Note: This paper has 3 sections A, B, and C, Attempt all the three sections

Section A: Answer all the questions; Section B: Answer any 2 out of 4; Section C: Answer all the questions, each question has an internal choice.

Abbreviations Used:

CLO- Course Outcome, PLO- Program Outcome, BTL- Bloom Taxonomy Level: BT level

1-Remember; BT level 2-Understand; BT level 3-Apply; BT level 4-Analyse; BT level 5-Evaluate, BT level 6-Create

SECTION A

Very short type questions (Attempt all)

(10x2 = 20 Marks)

Q. No.	Question	Marks	BTL	CLO	PLO
1.	Calculate the effective atomic number of and oxidation state of metal in $[\text{FeHCp}(\text{CO})\text{Cl}]$.	2	2	1	2
2	Find out the geometry of $\text{Ni}_5(\text{CO})_{12}^{2-}$.	2	2	2	2
3	Find out the number of improper axes of rotation in S_6 .	2	3	3	2
4	Calculate the geometry of Zintl ion Te_6^{+4} .	2	2	2	2
5	Describe the properties of $[\text{Mo}_2(\text{HPO}_4)_4]^{2-}$.	2	3	3	3
6	How many EPR lines are present in $^{13}\text{CF}_2\text{H}$ radical.	2	4	3	3
7	Calculate the fundamental vibrations in CO_2 molecule.	2	3	2	2
8	Write the selection rule of Mossbauer allowed transition.	2	1	1	2
9.	Draw the ^{31}P NMR spectrum of $\text{HFPO}(\text{OH})$ if $J_{\text{P-F}} > J_{\text{P-H}}$.	2	4	4	4
10.	Write the properties of Mulliken's symbol B_{2g} .	2	3	3	3

SECTION B

Long-type questions (Attempt any two out of four)

(10x2 = 20 Marks)

Q. No.	Question	Marks	BTL	CLO	PLO
1	a. Discuss the polymerization by Ziegler-Natta catalyst. b. Discuss the catalytic cycle of Wilkinson's catalyst.	10	3	3	3
2	How to synthesize the dinuclear clusters? Explain the bonding in $\text{Re}_2\text{Cl}_8^{-2}$.	10	6	5	3
3	Construct the character table of C_{2v} point group using the postulates.	10	6	6	5
4	What is g value? Discuss the factors affecting g value.	10	4	3	3

SECTION C

Short-type questions. (Attempt all the questions)

(4x5 = 20 Marks)

Q. No.	Question	Marks	BTL	CLO	PLO
1	Draw the MO diagram of CO and explain the synergistic effect. OR Discuss the synthesis and properties of ferrocene.	5	3	3	2
2	What are silicates? Describe the ortho- and pyro-silicates. OR Calculate the percentage packing fractions of SCC, FCC, and BCC and arrange them in increasing order.	5	3	3	2
3	Explain the diamagnetic and paramagnetic effect on ^1H NMR. OR Explain the Mossbauer spectrum of $[\text{Fe}(\text{CN})_6]^{3-}$ and $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$.	5	5	5	4
4	Discuss Kramer's degeneracy and explain the zero field splitting with a suitable example. OR Discuss the contact and pseudo-contact shift.	5	5	4	3