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M.Sc. Chemistry, Semester-I
End-term Examination 2023

Paper Name: Inorganic Chemistry-I
Time: 2:30 hours

Paper Code: MCHCC-103
Maximum Marks: 60

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

Section A: Answer all questions; **Section B:** Answer any two out of four questions; **Section C:** Answer all questions and each question has internal choice.

Abbreviations used.

CLO-Course Learning Outcome, PLO-Program Learning Outcome, BTL-Bloom Taxonomy Level, BTL1-Remember, BTL2-Understand, BTL3-Apply, BTL4-Analyse, BTL5-Evaluate, BTL6-Create.

Section A					
Attempt all questions			15X1 = 15 marks		
Q.No.	Question	BTL	PLO	CLO	
A1	Discuss the nature of the compounds: i. $B(OH)_3$ ii. $ClOH$	1-2	2	2	
A2	Draw the structure of PCl_3F_2 .	1-2	2	2	
A3	Calculate the total number of electrons in $C_2B_{10}H_{12}$.	2-3	1	2	
A4	Calculate the geometry of $B_{10}H_8(NH_3)_2$.	2-3	1	2	
A5	Calculate the magnetic moment of $[NiCl_4]^{2-}$.	2-3	2	2	
A6	Which is a better ambidentate ligand: OCN^- or SCN^- and why?	1-2	1	2	
A7	Complete the reaction: $[Co(NH_3)_3Cl_3] + AgNO_3 \rightarrow$	2-3	2	3	
A8	Which one is a good oxidizing agent and why? i) Pr^{3+} ii) Nd^{3+} iii) Tb^{3+} iv) Dy^{3+}	2-4	2	3	
A9	Which one is a good reducing agent and why? i) Ce^{3+} ii) Nd^{3+} iii) Sm^{3+} iv) Gd^{3+}	2-4	2	3	
A10	Calculate the STYX number in B_4H_{10} .	1-3	3	3	
A11	Write the denticity of $EDTA^{3-}$.	2	2	2	
A12	Calculate the magnetic moment of Gd^{3+} ion.	1-3	2	3	
A13	Indicate the number of unpaired electrons in Eu^{3+} .	2	1	2	
A14	Calculate the number of microstates in Silicon atom.	3-4	3	3	
A15	Write the outermost electronic configuration of Tb^{3+} .	2	2	2	

Section B					
Attempt any two out of four questions			2X10 = 20 marks		
Q.No.	Question	BTL	PLO	CLO	
B1	i. Define the non-aqueous solvents. Discuss the properties of H_2SO_4 as a solvent. ii. Define the Hard-Soft Acid-Base (HSAB) and discuss its applications.	2-3	2	3	

B2	What is the fluxionality? Explain the Berry pseudo-rotation mechanism and Ring whizzer process with suitable examples.	2-3	2	2
B3	Discuss the ground state term symbol and calculate the total term symbol of P^2 system.	3-4	3	3
B4	Calculate the effective magnetic moment of Ce^{3+} and Eu^{3+} .	4-5	2	3

Section C				
Attempt all questions and each question has internal choice		5X5 = 25 marks		
Q.No.	Question	BTL	PLO	CLO
C1	Describe the Bent rule with the help of suitable examples. OR Describe the geometry of BeH_2 molecule using Walsh's diagram.	2-3	2	3
C2	According to valence bond theory discuss the properties of $[Fe(H_2O)_6]^{3+}$ and $[Fe(CN)_6]^{4-}$. OR Calculate the crystal field stabilization energy of $[Cr(CN)_6]^{4-}$.	5-6	3	3
C3	Draw the molecular orbital diagram of $[Fe(H_2O)_6]^{2+}$. OR Discuss the cis and trans synthesis of $[Pt(NH_3)(NO_2)Cl_2]^-$.	2-4	3	3
C4	Describe the role of carbonic anhydrase in biological system. OR Describe the role of carboxypeptidase in biological system.	2-3	2	3
C5	Describe the catalysis of cytochrome P-450. OR Describe the characteristics of ammoniacal solution of alkali metals.	2-3	2	3