Reg. No										

AY 24

GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY, ODISHA, GUNUPUR

(GIET UNIVERSITY)

M. Sc. (First Semester - Regular) Examinations, February – 2025

24MCYPC11002 – Inorganic Chemistry – I

(Chemistry)

Time: 3 hrs | Maximum: 60 Marks

Answer ALL questions

(The figures in the right-hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer ***ALL*** the questions	CO #	Blooms Level
a. Predict the bond order in N_2 molecule with the help of MO energy level diagram.	CO1	K2
b. In normal spinel structure, $MgAl_2O_4$, the percentage of tetrahedral voids occupied	CO2	K2
c. Calculate the electronic ground state term for 'Cr' ion in $[Cr(CN_6)]^{-4}$.	CO3	K2
d. What is radio carbon dating?	CO4	K1
e. Distinguish between an atom bomb and a hydrogen bomb.	CO5	K1

PART – B **(10 x 5 = 50 Marks)**

Answer ***ALL*** the questions	Marks	CO #	Blooms Level
2.a. Discuss the VSEPR theory.	4	CO1	K1
b. Illustrate carefully that VSEPR theory has to be combined with the concept of hybridization to account for the geometry of covalent molecules.	6	CO1	K2
(OR)			
c. Construct the wave functions for sp^2.	10	CO1	K2
3.a. What are the important limitations of valence bond theory?	4	CO2	K1
b. Explain on the basis of valence bond theory that $[Ni(CN)_4]^{-2}$ ion with square planner structure is diamagnetic and $[NiCl_4]^{2-}$ ion with tetrahedral geometry is paramagnetic.	6	CO2	K1
(OR)			
c. Explain $[Fe(H_2O)_6]^{3+}$ is strongly paramagnetic whereas $[Fe(CN)_6]^{3-}$ is weakly paramagnetic.	5	CO2	K2
d. Which complex has larger crystal field splitting: $[Co(CN)_6]^{3-}$ or $[Co(NH_3)_6]^{3+}$	5	CO2	K1
4.a. Write short note on metal to ligand charge transfer	5	CO3	K1
b. Define magnetic susceptibility and its physical significance.	5	CO3	K2
(OR)			
c. Draw and discuss the qualitative correlation diagrams for the following systems: d^1 octahedral and d^8 tetrahedral	5	CO3	K2
d. Discuss the electronic spectra of $[Co(H_2O)_6]^{+2}$, $[FeCl_4]^{2-}$ and $[CoCl_4]^{2-}$.	6	CO3	K2
5.a. Write short note on Nuclear Fission.	5	CO4	K2
b. What is alpha decay?	5	CO4	K1
(OR)			
c. Write down the expression for the law of radioactivity	6	CO4	K1
d. What is meant by disintegration constant?	4	CO4	K1

6.a.	Explain on the basis of valence bond theory that $[Ni(CN)_4]^{-2}$ ion with square planner structure is diamagnetic and $[NiCl_4]^{2-}$ ion with tetrahedral geometry is paramagnetic.	6	CO2	K1
b.	Define crystal field stabilization energy. Calculate its value for the d^5 high spin octahedral.	4	CO2	K2
	(OR)			
c.	What is valence bond theory?	2	CO1	K2
d.	Explain the potential energy diagram for H_2 molecule.	8	CO1	K1

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