QP Code: RF23MSC013 | Reg. No | | | | | | | | | | | AY- 23

GIET UNIVERSITY, GUNUPUR – 765022

M. Sc. (First Semester) Regular Examinations, February – 2024

22CHPC102 - Inorganic Chemistry-I

(Chemistry)

Time: 3 hrs | Maximum: 70 Marks

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

PART – A **(2 x 10 = 20 Marks)**

Q.1. Answer ***ALL*** questions	CO #	Blooms Level
a. On the basis of hybridization, discuss the geometry of the following molecules: $IF_7$and XeF_4	CO1	K2
b. Difference between Bonding and antibonding orbitals.	CO1	K1
c. Define crystal field stabilization energy. Calculate its value for the d^6 *low* spin tetrahedral.	CO2	K2
d. The name of complex ion, $[Fe(CN)_6]^{3-}$ is	CO2	K1
e. Draw the Orgel diagrams for d^2 configurations of metal ions in their transition metal complexes.	CO2	K2
f. Discuss the electronic spectra of transition metal ions, $Ti^{3+}$and V^{3+}in their aqueous solution.	CO3	K2
g. CdS, HgS and BiI_3 are coloured due to which charge transfer spectra explain.	CO4	K1
h. What are nuclear reactions?	CO4	K1
i. Calculate the electronic ground state term for 'Cr' ion in $[Cr(CN_6)]^{-4}$	CO3	K2
j. What is radio carbon dating?	CO4	K1

PART – B **(10 x 5=50 Marks)**

Answer ***ANY FIVE*** questions	Marks	CO #	Blooms Level
2. a. Explain $[Co(NH_3)_6]^{3+}$ is an inner-orbital complex where as $[Ni(NH_3)_6]^{2+}$ is an outer-orbital complex	6	CO2	K2
b. Define crystal field stabilization energy. Calculate its value for the d^8 high spin tetrahedral.	4	CO2	K1
3.a. Explain the potential energy diagram for H_2 molecule.	10	CO1	K2
4. a. Explain on the basis of MO theory as to why oxygen molecule is paramagnetic while nitrogen molecule is diamagnetic.	6	CO1	K2
b. Write the postulates of Molecular orbital theory.	4	CO1	K1
5.a. Draw and discuss the qualitative correlation diagrams for the following systems: *(a)* d^9 octahedral and d^1tetrahedral	6	CO3	K2
b. The value of Δo in $[Mn(H_20)_6]^{3+}$ is 15,800 cm^{-1} while the mean pairing energy (P) in this complex is 28,000 cm^{-1}. Do you expect this ion to be high or low spin?	4	CO3	K2

6. a.	Derive the Rutherford -Soddy law.	6	CO4	K2
b.	Write short note on Nuclear Fission	4	CO4	K1
7.a.	Discuss the electronic spectra of $[Co(H_2O)_6]^{+2}$, $[FeCl_4]^{2-}$ and $[CoCl_4]^{2-}$.	6	CO3	K1
b.	$[MnO_4]^-$ is deep blue colour whereas $[Re0_4]^-$ is colourless .Explain it	4	CO3	K1
8. a.	Discuss metal to ligand charge transfer spectra.	6	CO3	K2
b.	What is radioactivity? In what units is radioactivity measured?	4	CO4	K1