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Gandhi Institute of Engineering and Technology University, Odisha, Gunupur
(GIET UNIVERSITY)

M.Sc. (First Semester - Regular) Examinations, January – 2026

24MBCYPC1002 –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)**

		CO #	Blooms Level
Q.1.	Answer ***ALL*** questions		
a.	Draw the structure & hybridization of XeF_2 and ClF_3	CO1	K3
b.	Calculate its CFSE value for the d^7 low spin octahedral.	CO2	K1
c.	Give the sequence of energy levels of *d* orbitals in square pyramidal crystal field.	CO3	K2
d.	Write note on Magnetic susceptibility.	CO4	K5
e.	What is radio carbon dating?	CO5	K1

PART – B **(10 x 5 = 50 Marks)**

		Marks	CO #	Blooms Level
	Answer ***ALL*** the questions			
2. 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.	5	CO1	K3
b.	Formation of the O_2 molecule in its ground and first excited states using Linnett's theory.	5	CO1	K4
	(OR)			
c.	Define crystal field stabilization energy. Calculate its value for the d^8 high spin tetrahedral.	5	CO1	K3
d.	Derive the wave function of sp hybrid orbital.	5	CO1	K2
3.a.	Find out the Magnetic moment values, hybridisation, shape and structure of $[Co(CN)_6]^{3-}$ or $[Co(NH_3)_6]^{3+}$	5	CO2	K3
b.	Discuss the VSEPR theory. Predict the shape of H_2O, NH_3 and CCl_4.	5	CO2	K1
	(OR)			
c.	Discuss the electronic spectra of $[Co(H_2O)_6]^{+2}$, $[FeCl_4]^{2-}$ and $[CoCl_4]^{2-}$.	5	CO2	K1,K4
d.	Draw N_2 molecule using linnet theory.	5	CO2	K5
4.a.	Calculate the electronic ground state term for 'Cr' ion in $[Cr(CN_6)]^{-4}$.	5	CO3	K3
b.	Draw and discuss the qualitative correlation diagrams for the following systems: (a) d^1 octahedral and (b)d^8 tetrahedral.	5	CO3	K5
	(OR)			
c.	Find out Z-in and Z-out value of d^1 configuration.	5	CO3	K4
d.	What are the transition bands of $[V(H_2O)_6]^{+3}$ & $[Ni(H_2O)_6]^{+2}$	5	CO3	K2
5.a.	Find out the energies of ground term configurations d^1 to d^{10}.	5	CO4	K3
b.	Find out the ground term and transition of d^3 state according to Tanabe Sugano.	5	CO4	K2
	(OR)			

c.	Find out the spinel of Co_3O_4 & $FeCr_2O_4$.	5	CO4	K4
d.	Draw the MO diagram for sigma bonded complex $[Co(F)_6]^{-3}$	5	CO4	K6
6.a.	What is radioactivity? In what units is radioactivity measured?	5	CO5	K1
b.	Briefly describe the use of radio isotopes in medical applications.	5	CO5	K2
	(OR)			
c.	Write down the expression for the disintegration of a radioactive substance. What is meant by disintegration constant?	5	CO5	K4
d.	Distinguish between an atom bomb and a hydrogen bomb.	5	CO5	K5

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