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22CHU516N

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2025
(Fifth Semester)

Branch - **CHEMISTRY**

INORGANIC CHEMISTRY - I

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	The color of transition metal compounds is mainly due to (a) ionization (b) d-d electronic transition (c) s-d transitions (d) thermal vibrations	K1	CO1
	2	The geometry of the coordination complex with coordination number 4 is (a) octahedral (b) Linear (c) square planar or tetrahedral (d) Trigonal bipyramidal	K2	CO1
2	3	Which type of hybridization is involved in an octahedral complex according to VBT? (a)sp^3 (b) sp^3d (c) d^2sp^3 (d) dsp^2	K1	CO2
	4	Which one of the following complex is diamagnetic? (a) $[Fe(CN)_6]^{3-}$ (b) $[CoF_6]^{3-}$ (c) $[Ni(CN)_4]^{2-}$ (d) $[Cu(H_2O)_4]^{2+}$	K2	CO2
3	5	Find the point which is not explained by Crystal Field Theory (a) Magnetic behavior (b) Shape of complexes (c) Colour of complexes (d) Covalent character in bonding	K1	CO3
	6	Interpret the ligand that exhibits strongest trans effect from the following (a) NH_3 (b) H_2O (c) CN^- (d) NO_2^-	K2	CO3
4	7	What metal ion is present at the center of the porphyrin ring in hemoglobin? (a) Mg (b)Zn (c) Fe (d) Cu	K1	CO4
	8	Relate the importance of Vitamin B12 in biological systems (a) electron carrier in photosynthesis (b) coenzyme in DNA synthesis and fatty acid metabolism (c) stores oxygen in muscle cells (d) transports iron in the bloodstream	K2	CO4
5	9	Which of the following metal carbonyl has trigonal bipyramidal geometry? (a) $Fe(CO)_5$ (b) $Cr(CO)_6$ (c) $Ni(CO)_4$ (d) $Fe_3(CO)_{12}$	K1	CO5
	10	Which type of bonding is outlined metal nitrosyl complexes? (a) Pure covalent bonding (b) Pure ionic bonding (c) Synergic bonding (d) Hydrogen bonding	K2	CO5

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SECTION - B (35 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Explain the trend in atomic and ionic radii across the first transition series. What causes these trends?	K2	CO1
		(OR)		
	11.b.	Classify the types of ligands with examples.		
2	12.a.	Apply Sidgwick's EAN rule to predict the stability of $[Fe(CN)_6]^{4-}$ and $[Cr(NH_3)_6]^{3+}$	K3	CO2
		(OR)		
	12.b.	Write spectrochemical series. Apply CFT to $[Fe(H_2O)_6]^{2+}$ complex and predict whether the complex is low spin or high spin complex.		
3	13.a.	Analyze how Jahn-Teller theorem explains tetragonal distortion in octahedral complexes of transition metals.	K4	CO3
		(OR)		
	13.b.	Examine the trans effect and its series to explain ligand substitution reaction in square planar complexes.		
4	14.a.	Conclude the role of Ferridoxin in biological systems.	K4	CO4
		(OR)		
	14.b.	Categorize the sources of vitamin B_{12}, inspect its structure and functions, and suggest sustainable ways to boost bioavailability.		
5	15.a.	Organize the preparation, properties and structure of $Cr(CO)_6$	K3	CO5
		(OR)		
	15.b.	Utilize your knowledge of coordination compounds, explain the preparation, properties and bonding of sodium nitroprusside.		

SECTION -C (30 Marks)

Answer **ANY THREE** questions

ALL questions carry **EQUAL** Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Analyze the geometrical and optical isomerism in octahedral complexes.	K4	CO1
2	17	Compare the crystal field theory for octahedral and tetrahedral complexes with an example for each.	K4	CO2
3	18	Examine and compare the predictive power of CFT and VBT in explaining geometry and colour of coordination compounds.	K4	CO3
4	19	Distinguish Chlorophyll and Cytochrome in terms of structure and function.	K4	CO4
5	20	Inspect ferrocene's preparation, assess its properties and structure, and conclude the importance of its bonding in organometallic chemistry.	K4	CO5

Z-Z-Z END