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NEET COORDINATION COMPOUNDS — CRYSTAL FIELD THEORY (CFT) — PYQS

Max. Marks: 64 **Questions:** 16

Section A (MCQ) — 16 questions

Q.1 According to crystal field theory, the correct order of ligands with respect to their decreasing order of field strength is [RE-NEET (UG) 2026]

(1) $Cl^- > NH_3 > H_2O > CO$
(2) $CO > NH_3 > H_2O > Cl^-$
(3) $CO > H_2O > NH_3 > Cl^-$
(4) $Cl^- > H_2O > NH_3 > CO$

Scan or tap for the full solution

Q.2 Among the species given below, the spin-only magnetic moment is highest for
(Given: Atomic number of Ti = 22, Mn = 25, Fe = 26 and Co = 27) [RE-NEET (UG) 2026]

(1) $[Ti(H_2O)_6]^{3+}$ (2) $[Mn(CN)_6]^{3-}$
(3) $[Fe(CN)_6]^{3-}$ (4) $[Co(NH_3)_6]^{3+}$

Scan or tap for the full solution

Q.3 Match **List-I** with **List-II** :

List-I		List-II	
a.	$[Fe(CN)_6]^{3-}$	i.	5.92 BM
b.	$[Fe(H_2O)_6]^{3+}$	ii.	0 BM
c.	$[Fe(CN)_6]^{4-}$	iii.	4.90 BM
d.	$[Fe(H_2O)_6]^{2+}$	iv.	1.73 BM

Choose the correct answer from the options given below. [NEET (UG) 2021]

(1) (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)
(2) (a)-(iv), (b)-(ii), (c)-(i), (d)-(iii)
(3) (a)-(ii), (b)-(iv), (c)-(iii), (d)-(i)
(4) (a)-(i), (b)-(iii), (c)-(iv), (d)-(ii)

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Q.4 Which of the following is the correct order of increasing field strength of ligands to form coordination compounds? [NEET (UG) 2020]

(1) $SCN^- < F^- < CN^- < C_2O_4^{2-}$
(2) $F^- < SCN^- < C_2O_4^{2-} < CN^-$
(3) $CN^- < C_2O_4^{2-} < SCN^- < F^-$
(4) $SCN^- < F^- < C_2O_4^{2-} < CN^-$

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Q.5 What is the **correct** electronic configuration of the central atom in $K_4[Fe(CN)_6]$ based on crystal field theory? [NEET (UG) 2019]

(1) $t_{2g}^4 e_g^2$ (2) $t_{2g}^6 e_g^0$ (3) $e^3 t_2^3$ (4) $e^4 t_2^2$

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Q.6 Jahn-Teller effect is not observed in high spin complexes of [NEET 2016 (Phase 2)]

(1) d^7 (2) d^8 (3) d^4 (4) d^9

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Q.7 Which of these statements about $[Co(CN)_6]^{3-}$ is true? [AIPMT 2015 (Cancelled)]

(1) $[Co(CN)_6]^{3-}$ has four unpaired electrons and will be in a high-spin configuration.
(2) $[Co(CN)_6]^{3-}$ has no unpaired electrons and will be in a high-spin configuration.
(3) $[Co(CN)_6]^{3-}$ has no unpaired electrons and will be in a low-spin configuration.
(4) $[Co(CN)_6]^{3-}$ has four unpaired electrons and will be in a low-spin configuration.

Scan or tap for the full solution

Q.8 Among the following complexes the one which shows zero crystal field stabilization energy (CFSE) is [AIPMT 2014]

(1) $[Mn(H_2O)_6]^{3+}$ (2) $[Fe(H_2O)_6]^{3+}$
(3) $[Co(H_2O)_6]^{2+}$ (4) $[Co(H_2O)_6]^{3+}$

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Q.9 Crystal field splitting energy for high spin d^4 octahedral complex is [NEET 2013 (Karnataka)]

(1) $-1.2\ \Delta_o$ (2) $-0.6\ \Delta_o$ (3) $-0.8\ \Delta_o$ (4) $-1.6\ \Delta_o$

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Q.10 Low spin complex of d^6-cation in an octahedral field will have the following energy [AIPMT 2012 (Mains)]

(1) $\frac{-12}{5}\Delta_o + P$ (2) $\frac{-12}{5}\Delta_o + 3P$

(3) $\frac{-2}{5}\Delta_o + 2P$ (4) $\frac{-2}{5}\Delta_o + P$

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Q.11 Crystal field stabilization energy for high spin d^4 octahedral complex is [AIPMT 2010 (Prelims)]

(1) $-1.8\ \Delta_0$ (2) $-1.6\ \Delta_0 + P$

(3) $-1.2\ \Delta_0$ (4) $-0.6\ \Delta_0$

Scan or tap for the full solution

Q.12 Which of the following complexes exhibits the highest paramagnetic behaviour?
where gly = glycine, en = ethylenediamine and bpy = bipyridyl moieties.
(At. nos. Ti = 22, V = 23, Fe = 26, Co = 27) [AIPMT 2008]

(1) $[Co(ox)_2(OH)_2]^-$

(2) $[Ti(NH_3)_6]^{3+}$

(3) $[V(gly)_2(OH)_2(NH_3)_2]^+$

(4) $[Fe(en)(bpy)(NH_3)_2]^{2+}$

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Q.13 In which of the following coordination entities the magnitude of Δ_o (CFSE in octahedral field) will be maximum?
(At. No. Co = 27) [AIPMT 2008]

(1) $[Co(CN)_6]^{3-}$ (2) $[Co(C_2O_4)_3]^{3-}$

(3) $[Co(H_2O)_6]^{3+}$ (4) $[Co(NH_3)_6]^{3+}$

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Q.14 $[Cr(H_2O)_6]Cl_3$ (At. no. of Cr = 24) has a magnetic moment of 3.83 B.M. The correct distribution of 3d electrons in the chromium of the complex is [AIPMT 2006]

(1) $3d^1_{xy}$, $3d^1_{yz}$, $3d^1_{z^2}$

(2) $3d^1_{(x^2-y^2)}$, $3d^1_{z^2}$, $3d^1_{xz}$

(3) $3d^1_{xy}$, $3d^1_{(x^2-y^2)}$, $3d^1_{yz}$

(4) $3d^1_{xy}$, $3d^1_{yz}$, $3d^1_{xz}$

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Q.15 CN^- is a strong field ligand. This is due to the fact that [AIPMT 2004]

(1) it carries negative charge

(2) it is a pseudohalide

(3) it can accept electrons from metal species

(4) it forms high spin complexes with metal species.

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Q.16 Considering H_2O as a weak field ligand, the number of unpaired electrons in $[Mn(H_2O)_6]^{2+}$ will be (atomic number of Mn = 25) [AIPMT 2004]

(1) three (2) five (3) two (4) four

Scan or tap for the full solution

ANSWER KEY

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	**2**	**2**	**1**	**4**	**2**	**2**	**3**	**2**	**2**	**2**	**4**
Ques.	12	13	14	15	16						
Ans.	**1**	**1**	**4**	**2**	**2**						