1. Match List I with List II.

List I (Complex)		List II (Type of isomerism)	
A	$[Co(NH_3)_5(NO_2)]Cl_2$	I	Solvate isomerism
B	$[Co(NH_3)_5(SO_4)]Br$	II	Linkage isomerism
C	$[Co(NH_3)_6][Cr(CN)_6]$	III	Ionization isomerism
D	$[Co(H_2O)_6]Cl_3$	IV	Coordination isomerism

Choose the correct answer from the options given below: **(2024)**

(a) A-I, B-III, C-IV, D-II
(b) A-I, B-IV, C-III, D-II
(c) A-II, B-IV, C-III, D-I
(d) A-II, B-III, C-IV, D-I

2. Given below are two statements:

Statement I: Both $[Co(NH_3)_6]^{3+}$ and $[CoF_6]^{3-}$ complex are octahedral but differ in their magnetic behaviour.

Statement II: $[CO(NH_3)_6]^{3+}$ is diamagnetic whereas $[CoF_6]^{3-}$ is paramagnetic.

In the light of the above statements, choose the correct answer the options given below: **(2024)**

(a) Both Statement I and Statement II are false.
(b) Statements I is true but statement II is false.
(c) Statement I is false but statement II is true.
(d) Both Statement I and statement II are true

3. Given below are two statements:

Statements I : $[Co(NH_3)_6]^{3+}$ is a homoleptic Complex whereas $[Co(NH_3)_4Cl_2]^{+}$ is a heteroleptic complex.

Statement II : Complex $[Co(NH_3)_6]^{3+}$ has only one kind of ligands but $[Co(NH_3)_4Cl_2]^{+}$ has more than one kind of ligands.

In the light of the above statements, choose the correct answer from the options given below: **(2024)**

(a) Both statement I and statement II are false.
(b) Statement I is true but statement II are false.
(c) Statement I is false but statement II is true.
(d) Both statement I and Statement II are true.

4. Select the element (M) whose trihalides cannot be hydrolysed to produce an ion of the form $[M(H_2O_6]^{3+}$ **(2023)**

(a) Ga (b) In
(c) Al (d) B

5. Which of the following forms a set of complex and a double salt, respectively? **(2023)**

(a) $CuSO_4 \cdot 5H_2O$ and $CuCl_2 \cdot 4NH_3$
(b) $PtCl_2 \cdot 2NH_3$ and $PtCl_4 \cdot 2HCl$
(c) $K_2PtCl_2 \cdot 2NH_3$ and $KAl(SO_4)_2 \cdot 12H_2O$
(d) $NiCl_2 \cdot 6H_2O$ and $NiCl_2(H_2O)_4$

6. Type of isomerism exhibited by compounds $[Cr(H_2O)_6]Cl_3$, $[Cr(H_2O)_5Cl]Cl_2 \cdot H_2O$, $[Cr(H_2O)_4Cl_2]Cl \cdot 2H_2O$ and the value of coordination number (CN) of central metal ion in all these compounds, respectively is: **(2023)**

(a) Geometrical isomerism, CN = 2
(b) Optical isomerism, CN = 4
(c) Ionisation isomerism, CN = 4
(d) Solvate isomerism, CN = 6

7. Homoleptic complex from the following complexes is: **(2023)**

(a) Diamminechloridonitrito-N-platinum(II)
(b) Pentaamminecarbonatocobalt(III) chloride
(c) Triamminetriaquachromium(III) chloride
(d) Potassium trioxalatoaluminate(III)

8. Which complex compound is most stable? **(2023)**

(a) $[Co(NH_3)_3(NO_3)_3]$
(b) $[CoCl_2(en)_2]NO_3$
(c) $[Co(NH_3)_6]_2(SO_4)_3$
(d) $[Co(NH_3)_4(H_2O)Br](NO_3)_2$

9. Match List I with List II:

	List I (Complexes)		**List II (Types)**
A.	$[Co(NH_3)_5NO_2]Cl_2$ and $[Co(NH_3)_5ONO]Cl_2$	1.	Ionisation isomerism
B.	$[Cr(NH_3)_6][Co(CN)_6]$ and $[Cr(CN)_6][Co(NH3)6$	2.	Coordination isomerism
C.	$[Co(NH_3)_5(SO_4)]Br$ and $[Co(NH_3)_5Br]SO_4$	3.	Linkage isomerism
D.	$[Cr(H_2O)_6]Cl_3$ and $[Cr(H_2O)_5Cl]Cl_2 \cdot H_2O$	4.	Solvate isomerism

Choose the correct answer from the options given below: **(2022)**

(a) A-4, B-3, C-2, D-1
(b) A-3, B-1, C-2, D-4
(c) A-2, B-3, C-4, D-1
(d) A-3, B-2, C-1, D-4

10. Given below are two statements: One is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A): The metal carbon bond in metal carbonyls possesses both σ and π character.

Reason (R): The ligand to metal bond is a π bond and metal to ligand bond is a σ bond.

In the light of the above statements, choose the most appropriate answer from the options given below: **(2022)**

(a) (A) is not correct but (R) is correct.
(b) Both (A) and (R) are correct and (R) is the correct explanation of (A).
(c) Both (A) and (R) are correct but (R) is the not the correct explanation of (A).
(d) (A) is correct but (R) is not correct.

11. The IUPAC name of the complex- $[Ag(H_2O)_2][Ag(CN)_2]$ is: **(2022)**

(a) dicyanidosilver(II) diaquaargentate(II)
(b) diaquasilver(II) dicyanidoargentate(II)
(c) dicyanidosilver(I) diaquaargentate(I)
(d) diaquasilver(I) dicyanidoargentate(I)

12. The order of energy absorbed which is responsible for the color of complexes

(A) $[Ni(H_2O)_2(en)_2]^{2+}$
(B) $[Ni(H_2O)_4(en)]^{2+}$ and
(C) $[Ni(en)_3]^{2+}$
is: **(2022)**

(a) A > B > C
(b) C > B > A
(c) C > A > B
(d) B > A > C

13. Ethylene diaminetetraacetate (EDTA) ion is: **(2021)**

(a) Unidentate ligand
(b) Bidentate ligand with two "N" donor atoms
(c) Tridentate ligand with three "N" donor atoms
(d) Hexadentate ligand with four "O" and two "N" donor atoms

14. Match List-I with List-II: **(2021)**

	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

(a) A-(ii) B-(iv) C-(iii) D-(i)
(b) A-(i) B-(iii) C-(iv) D-(ii)
(c) A-(iv) B-(i) C-(ii) D-(iii)
(d) A-(iv) B-(ii) C-(i) D-(iii)

15. Which of the following is the correct order of increasing field strength of ligands to form coordination compounds? **(2020)**

(a) $SCN^- < F^- < CN^- < C_2O_4^{2-}$
(b) $F^- < SCN^- < C_2O_4^{2-} < CN^-$
(c) $CN^- < C_2O_4^{2-} < SCN^- < F^-$
(d) $SCN^- < F^- < C_2O_4^{2-} < CN$

16. Match the coordination number and type of hybridization with distribution of hybrid orbitals in space based on Valence bond theory:

(2020 Covid Re-NEET)

Coordination number and type of hybridization		Distribution of hybrid orbitals in space	
(A)	$4, sp^3$	(i)	Trigonal bipyramidal
(B)	$4, dsp^2$	(ii)	Octahedral
(C)	$5, sp^3d$	(iii)	Tetrahedral
(D)	$6, d^2sp^3$	(iv)	Square planar

Select the correct option:
(a) A-(iii) B-(iv) C-(i) D-(ii)
(b) A-(iv) B-(i) C-(ii) D-(iii)
(c) A-(iii) B-(i) C-(iv) D-(ii)
(d) A-(ii) B-(iii) C-(iv) D-(i)

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

(a) $t_{2g}^4e_g^2$ (b) $t_{2g}^6e_g^0$
(c) $e^3t_{2g}^3$ (d) $e^4t_{2g}^2$

18. Iron carbonyl, $Fe(CO)_5$ is **(2018)**
(a) Tetranuclear (b) Mononuclear
(c) Dinuclear (d) Trinuclear

19. The type of isomerism shown by the complex $[CoCl_2(en)_2]$ is: **(2018)**
(a) Geometrical isomerism
(b) Coordination isomerism
(c) Linkage isomerism
(d) Ionization isomerism

20. The geometry and magnetic behaviour of the complex $[Ni(CO)_4]$ are? **(2018)**
(a) Square planar geometry and diamagnetic
(b) Tetrahedral geometry and diamagnetic
(c) Tetrahedral geometry and paramagnetic
(d) Square planar geometry and paramagnetic

21. Correct increasing order for the wavelengths of absorption in the visible region for the complexes of Co^{3+} is: **(2017-Delhi)**
(a) $[Co(NH_3)_6]^{3+}, [Co(en)_3]^{3+}, [Co(H_2O)_6]^{3+}$
(b) $[Co(en)_3]^{3+}, [Co(NH_3)_6]^{3+}, [Co(H_2O)_6]^{3+}$
(c) $[Co(H_2O)_6]^{3+}, [Co(en)_3]^{3+}, [Co(NH_3)_6]^{3+}$
(d) $[Co(H_2O)_6]^{3+}, [Co(NH_3)_6]^{3+}, [Co(en)_3]^{3+}$

22. Pick out the correct statement with respect to $[Mn(CN)_6]^{3-}$ **(2017-Delhi)**
(a) It is dsp^2 hybridised and square planar
(b) It is sp^3d^2 hybridised and octahedral
(c) It is sp^3d^2 hybridised and tetrahedral
(d) It is d^2sp^3 hybridised and octahedral

23. The correct order of the stoichiometries of $AgCl$ formed when $AgNO_3$ in excess is treated with the complexes:
$CoCl_3.6NH_3, CoCl_3.5NH_3\ CoCl_3.4NH_3$
respectively is: **(2017-Delhi)**
(a) $2AgCl, 3AgCl, 1AgCl$
(b) $1AgCl, 3AgCl, 2AgCl$
(c) $3AgCl, 1AgCl, 2AgCl$
(d) $3AgCl, 2AgCl, 1AgCl$

24. Which of the following complex ions is not diamagnetic? **(2017-Gujarat)**
(a) $[Sc(H_2O)_3(NH_3)_3]^{3+}$
(b) $[Ti(en)_2(NH_3)_2]^{4+}$
(c) $[Cr(NH_3)_6]^{3+}$
(d) $[Zn(NH_3)_6]^{2+}$

25. For the tetrahedral complex $[MnBr_4]^{2-}$, the spin only magnetic moment value is: **(2017-Gujarat)**
(a) 2.4 (b) 1.7
(c) 5.9 (d) 4.8

26. The electron distribution in d^n coordination complexes depends on magnitude of crystal field splitting, (Δ_0) and pairing energy (P). The condition which favours formation of high spin complexes is: **(2017-Gujarat)**
(a) $t_{2g}{}^4e_g^0$ (b) $\Delta_0 > P$
(c) $\Delta_0 < P$ (d) $\Delta_0 = P$

27. The $[Co(H_2O)_6]^{2+}$ ion has three unpaired electrons. The hybridization of Co in $[Co(H_2O)_6]^{2+}$ is: **(2017-Gujarat)**
(a) d^2sp^3 (b) sp^3
(c) dsp^2 (d) sp^3d^2

28. The correct increasing order of trans-effect of the following species is:
(a) $NH_3 > CN^- > Br^-C_6H_5^-$V
(b) $CN^- > C_6H_5^- > Br^- > NH_3$
(c) $Br^- > CN^- > NH_3 > C_6H_5^-$
(d) $CN^- > Br^- > C_6H_5^- > NH_3$

29. Jahn-Teller effect is not observed in high spin complexes of:
(a) d^7 (b) d^8
(c) d^4 (d) d^9

30. Which of the following has longest C-O bond length?
(Free C–O bond length in CO is 1.128Å) **(2016-I)**
(a) $[Mn(CO)_6]^+$ (b) $Ni(CO)_4$
(c) $[Co(CO)_4]^-$ (d) $[Fe(CO)_4]^{2-}$

31. The name of complex ion, $[Fe(CN)_6]^{3-}$ is: **(2015 Re)**
(a) Hexacyanidoferrate (III) ion
(b) Hexacyanoiron (III) ion
(c) Hexacyanoferrate (III) ion
(d) Tricyanoferrate (III) ion

32. The hybridization involved in complex $[Ni(CN)_4]^{2-}$ is
(Atomic Number Ni = 28) **(2015 Re)**
(a) d^2sp^3 (b) dsp^2
(c) sp^3 (d) d^2sp^2

33. Number of possible isomers for the complex $[Co(en)_2Cl_2]$ Cl will be:
(en = ethylenediamine) **(2015 Re)**
(a) 4 (b) 2
(c) 1 (d) 3

34. Which of these statements about $[Co(CN)_6]^{3-}$ is true? **(2015)**
(a) $[Co(CN)_6]^{3-}$ has four unpaired electrons and will be in a low-spin configuration
(b) $[Co(CN)_6]^{3-}$ has four unpaired electrons and will be in a high-spin configuration
(c) $[Co(CN)_6]^{3-}$ has no unpaired electrons and will be in a high-spin configuration
(d) $[Co(CN)_6]^{3-}$ has no unpaired electrons and will be in a low-spin configuration

35. Cobalt(III) chloride forms several octahedral complexes with ammonia. Which of the following will not give test for chloride ions with silver nitrate at 25°C? **(2015)**
(a) $CoCl_3.4NH_3$
(b) $CoCl_3.5NH_3$
(c) $CoCl_3.6NH_3$
(d) $CoCl_3.3NH_3$

36. The sum of corrdination number and oxidation number of the metal M in the complex $[M(en)_2(C_2O_4)]Cl$ (where en is ethylenediamine) is: **(2017 Re)**
(a) 6 (b) 7
(c) 8 (d) 9

37. Among the following complexes the one which shows zero crystal field stabilization energy (CFSE) is: **(2014)**
(a) $[Fe(H_2O)_6]^{3+}$
(b) $[Co(H_2O)_6]^{2+}$
(c) $[Co(H_2O)_6]^{3+}$
(d) $[Mn(H_2O)_6]^{3+}$

38. Which of the following complexes is used to be as an anticancer agent? **(2014)**
(a) $cis-[PtCl_2(NH_3)_2]$
(b) $cis-K_2[PtCl_2Br_2]$
(c) $Na_2[CoCl_4]$
(d) $mer-[Co(NH_3)_3Cl_3]$