1. 'Spin only' magnetic moment is same for which of the following ions? **(2024)**

A. Ti^{3+} B. Cr^{2+}
C. Mn^{2+} D. Fe^{2+}
E. Sc^{3+}

Choose the most appropriate answer from the options given below:
(a) A and E only
(b) B and C only
(c) A and D only
(d) B and D only

2. The E° value for the Mn^{3+}/Mn^{2+} couple is more positive than that of Cr^{3+}/Cr^{2+} or Fe^{3+}/Fe^{2+} due to change of **(2024)**
(a) d^5 to d^2 configuration
(b) d^4 to d^5 configuration
(c) d^3 to d^5 configuration
(d) d^5 to d^4 configuration

3. The pair of lanthanoid ions which are diamagnetic is **(2024)**
(a) Ce^{3+} and Eu^{2+} (b) Gd^{3+} and Eu^{3+}
(c) Pm^{3+} and Sm^{3+} (d) Ce^{4+} and Yb^{2+}

4. Given below are two statements: One is labelled as Assertion (A) and the other is labelled as Reason (R). **(2023)**

Assertion (A): Ionization enthalpy increases along each series of the transition elements from left to right. However, small variations occur.

Reason (R): There is corresponding increase in nuclear charge which accompanies the filling of electrons in the inner d-orbitals.

In the light of the above statements, choose the most appropriate answer from the options given below:
(a) (A) is correct but (R) is not correct.
(b) (A) is not correct but (R) is correct.
(c) Both (A) and (R) are correct and (R) is the correct explanation of (A).
(d) Both (A) and (R) are correct but (R) is not the correct explanation of (A).

5. The solubility of Cu^{+2} is more than Cu^{+} salts in aqueous solution due to- **(2023)**
(a) enthalpy of atomization.
(b) hydration energy.
(c) second ionisation enthalpy.
(d) first ionisation enthalpy.

6. Which of the following statements are INCORRECT?
A. All the transition metals except scandium form MO oxides which are ionic.
B. The highest oxidation number corresponding to the group number in transition metal oxides is attained in Sc_2O_3 to Mn_2O_7.
C. Basic character increases from V_2O_3 to V_2O_4 to V_2O_5.
D. V_2O_4 dissolves in acids to give VO_4^{3-} salts.
E. CrO is basic but Cr_2O_3 is amphoteric.

Choose the correct answer from the options given below: **(2023)**
(a) B and D only
(b) C and D only
(c) B and C only
(d) A and E only

7. Given below are two statements:

Statement I: Cr^{2+} is oxidising and Mn^{3+} is reducing in nature.

Statement II: Sc^{3+} compounds are repelled by the applied magnetic field.

In the light of the above statements, choose the most appropriate answer from the options given below: **(2022)**
(a) Statement I is incorrect but Statement II is correct.
(b) Both Statement I and Statement II are correct.
(c) Both Statement I and Statement II are incorrect.
(d) Statement I is correct but Statement is incorrect.

8. Zr (Z = 40) and Hf (Z = 72) have similar atomic and ionic radii because of: **(2021)**

(a) Diagonal relationship
(b) Lanthanoid contraction
(c) Having similar chemical properties
(d) Belonging to same group

9. The incorrect statement among the following is: **(2021)**

(a) Most of the trivalent Lanthanoid ions are colorless in the solid state
(b) Lanthanoids are good conductors of heat and electricity
(c) Actinoids are highly reactive metals, especially when finely divided
(d) Actinoid contraction is greater for element to element that Lanthanoid contraction

10. The calculated spin only magnetic moment of Cr^{2+} ion is **(2020)**

(a) 4.90 BM (b) 5.92 BM
(c) 2.84 BM (d) 3.87 BM

11. Identify the incorrect statement. **(2020)**

(a) The transition metals and their compounds are known for their catalytic activity due to their ability to adopt multiple oxidation states and to form complexes.
(b) Interstitial compounds are those that are formed when small atoms like H, C or N are trapped inside the crystal lattices of metals.
(c) The oxidation states of chromium in CrO_4^{2-} and $Cr_2O_7^{2-}$ are not the same.
(d) $Cr^{2+}(d^4)$ is a stronger reducing agent than $Fe^{2+}(d^6)$ in water.

12. Match the following aspects with the respective metal.

(2020 Covid Re-NEET)

Aspects		**Metal**	
(A)	The metal which reveals a maximum number of oxidation states	(i)	Scandium
(B)	The metal although placed in 3d block is considered not as a transition element	(ii)	Copper
(C)	The metal which does not exhibit variable oxidation states	(iii)	Manganese
(D)	The metal which in +1 oxidation state in aqueous solution undergoes disproportionation	(iv)	Zinc

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

13. Identify the incorrect statement from the following: **(2020 Covid Re-NEET)**

(a) Lanthanoids reveal only +3 oxidation state.
(b) The lanthanoid ions other than f^0 type and the f^{14} type are all paramagnetic.
(c) The overall decreases in atomic and ionic radii from lanthanum to luteium is called lanthanoid contraction.
(d) Zirconium and Hafnium have identical radii of 160 pm and 159 pm, respectively as a consequence of lanthanoid contraction.

14. Match the element in column I with that in column II. **(2020 Covid Re-NEET)**

Column I		**Column II**	
(A)	Copper	(i)	Non-metal
(B)	Fluorine	(ii)	Transition metal
(C)	Silicon	(iii)	Lanthanoid
(D)	Cerium	(iv)	Metalloid

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

15. The manganate and permanganate ions are tetrahedral, due to: **(2019)**

(a) The π-bonding involves overlap of p-orbitals of oxygen with d-orbitals of manganese

(b) There is no π-bonding

(c) The π-bonding involves overlap of p-orbitals of oxygen with p-orbitals of manganese

(d) The π-bonding involves overlap of d-orbitals of oxygen with d-orbitals of manganese

16. Which of the following ions exhibits d-d transition and paramagnetism as well? **(2018)**

(a) CrO_4^{2-} (b) $Cr_2O_7^{2-}$

(c) MnO_4^{2-} (d) MnO_4^-

17. Match the metal ions given in Column I with the spin magnetic moments of the ions given in Column II and assign the correct code: **(2018)**

Column I		**Column II**	
A.	Co^{3+}	(i)	$\sqrt{8}$ BM
B.	Cr^{3+}	(ii)	$\sqrt{35}$ BM
C.	Fe^{3+}	(iii)	$\sqrt{3}$ BM
D.	Ni^{2+}	(iv)	$\sqrt{24}$ BM
		(v)	$\sqrt{15}$ BM

(a) A-(iv) B-(v) C-(ii) D-(i)

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

(c) A-(iii) B-(v) C-(i) D-(ii)

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

18. Name the gas that can readily decolourise acidified $KMnO_4$ solution: **(2017-Delhi)**

(a) P_2O_5 (b) CO_2

(c) SO_2 (d) NO_2

19. The reason for greater range of oxidation states in actinoids is attributed to: **(2017-Delhi)**

(a) $4f$ and $5d$ levels being close in energies

(b) The radioactive nature of actinoids

(c) Actinoid contraction

(d) $5f$, $6d$ and $7s$ levels having comparable energies

20. $HgCl_2$ and I_2 both when dissolved in water containing I^- ions the pair of species formed is: **(2017-Delhi)**

(a) Hg_2I_2, I^- (b) HgI_2, I_3^-

(c) HgI_2, I^- (d) HgI_4^{2-}, I_3^-

21. Which of the following lanthanoids shows +4 oxidation state to acquire noble gas configuration? (Atomic noumber : La = 57, Ce = 58, Eu = 63 and Yb = 70) **(2017-Gujarat)**

(a) Eu (b) Ce

(c) Yb (d) La

22. Which one of the following statements related to lanthanons is incorrect? **(2016-II)**

(a) All the lanthanons are much more reactive than aluminium

(b) Ce(+4) solutions are widely used as oxidizing agent in volumetric analysis

(c) Europium shows +2 oxidation state.

(d) The basicity decreases as the ionic radius decreases from Pr to Lu.

23. The electronic configurations of Eu (Atomic Number 63) Gd (Atomic Number 64) and Tb (Atomic Number 65) are: **(2016-I)**

(a) $[Xe]4f^76s^2, [Xe]4f^75d^16s^2$ and $[Xe]4f^96s^2$

(b) $[Xe]4f^76s^2, [Xe]4f^86s^2$ and $[Xe]4f^85d^16s^2$

(c) $[Xe]4f^65d^16s^2, [Xe]4f^75d^16s^2$ and $[Xe]4f^95d^16s^2$

(d) $[Xe]4f^65d^16s^2, [Xe]4f^75d^16s^2$ and $[Xe]4f^85d^16s^2$

24. Which one of the following statements is correct when SO_2 is passed through acidified $K_2Cr_2O_7$ solution? **(2016-I)**

(a) SO_2 is reduced

(b) Green $Cr_2(SO_4)_3$ is formed

(c) The solution turns blue

(d) The solution is decolourised

25. Gadolinium belongs to 4f series. Its atomic number is 64. Which of the following is the correct electronic configuration of gadolinium? **(2015 Re)**

(a) $[Xe]4f^65d^26s^2$

(b) $[Xe]4f^86d^2$

(c) $[Xe]4f^95s^1$

(d) $[Xe]4f^75d^16s^2$

26. Because of lanthanoid contraction, which of the following pairs of elements have nearly same atomic radii? (Numbers in the parenthesis are atomic numbers) **(2015)**

(a) $Zr(40)\ and\ Nb(41)$
(b) $Zr(40)\ and\ Hf\ (72)$
(c) $Zr\ (40)\ and\ Ta\ (73)$
(d) $Ti\ (22)\ and\ Zr\ (40)$

27. Which of the following processes does not involve oxidation of iron? **(2015)**

(a) Decolourisation of blue $CuSO_4$ solution by iron
(b) Formation of $Fe(CO)_5$ from Fe
(c) Liberation of H_2 from steam by iron at high temperature
(d) Rusting of iron sheets

28. Magnetic moment 2.84 B.M. is given by: (Atomic numbers, Ni = 28, Ti = 22, Cr = 24, Co = 27) **(2015)**

(a) Ti^{3+} (b) Cr^{2+}
(c) Co^{2+} (d) Ni^{2+}

29. Reason of lanthanoid contraction is: **(2014)**

(a) Increasing nuclear charge
(b) Decreasing nuclear charge
(c) Decreasing screening effect
(d) Negligible screening effect of 'f' orbitals

30. Magnetic moment 2.83 BM is given by which of the following ions? **(2014)**
(Atomic Number Ti = 22, Cr = 24, Mn = 25, Ni = 28)

(a) Ni^{2+} (b) Cr^{3+}
(c) Mn^{2+} (d) Ti^{3+}

31. Which of the following statements about the interstitial compounds is incorrect? **(2013)**

(a) They retain metallic conductivity
(b) They are chemically reactive
(c) They are much harder than the pure metal
(d) They have higher melting points than the pure metal

32. Which of the following lanthanoid ions is diamagnetic?
(Atomic Number Ce = 58, Sm = 62, Eu = 63, Yb = 70) **(2013)**

(a) Ce^{2+} (b) Sm^{2+}
(c) Eu^{2+} (d) Yb^{2+}

33. Identify the correct order of solubility in aqueous medium: **(2013)**

(a) $Na_2S > CuS > ZnS$
(b) $Na_2S > ZnS > CuS$
(c) $CuS > ZnS > Na_2S$
(d) $ZnS > Na_2S > CuS$