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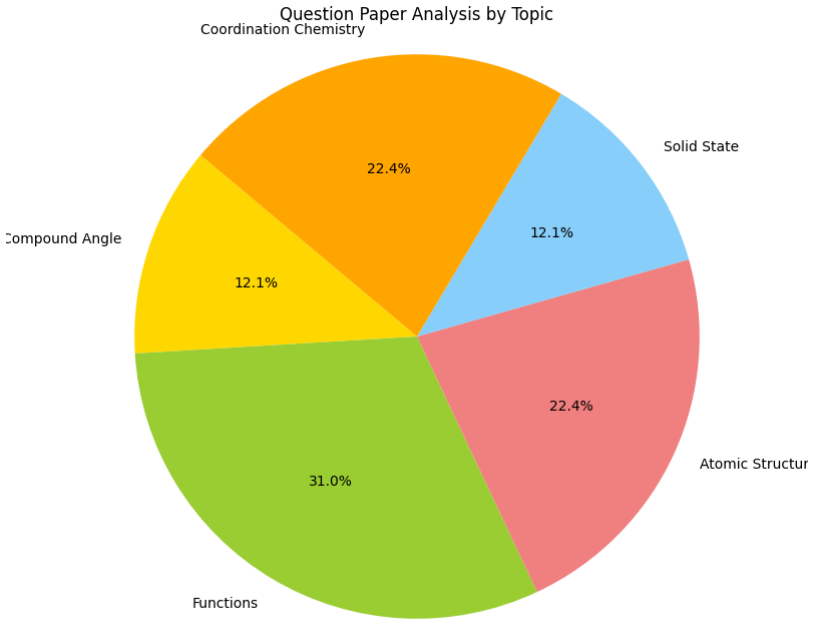
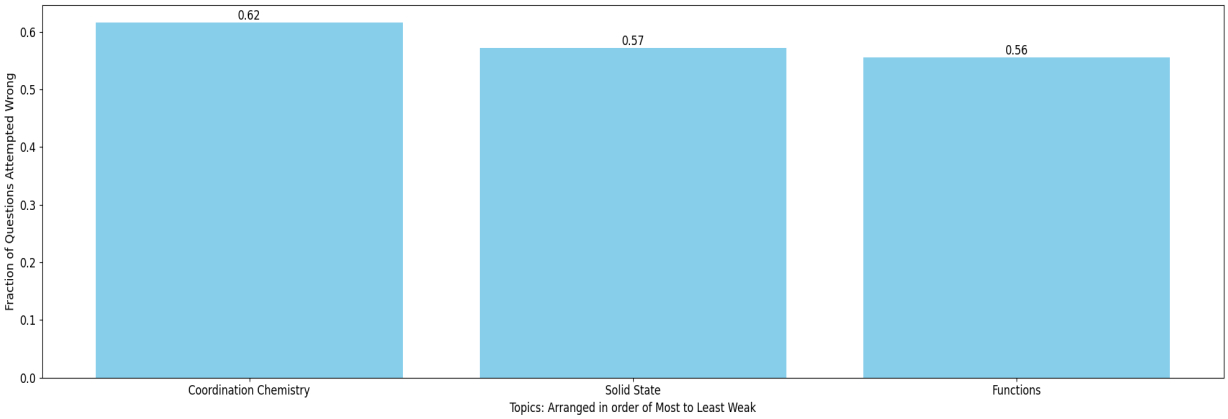
MLAssist - Personalised DPP

Question Paper Analysis:



Weak Topic Analysis:



Practice Questions:

Coordination Chemistry:

12. Among the following metal carbonyls, the C–O bond order is lowest in **[JEE 2007]**

(A) $[Mn(CO)_6]^+$ (B) $[Fe(CO)_5]$ (C) $[Cr(CO)_6]$ (D) $[V(CO)_6]^-$

19. In which of the following pairs, both the complexes have the same geometry but different hybridisation

(A) $[NiCl_4]^{2-}$, $[Ni(CN)_4]^{2-}$ (B) $[CoF_6]^{3-}$, $[Co(NH_3)_6]^{3+}$

(C) $[Ni(CO)_4]$, $[Ni(CN)_4]^{2-}$ (D) $[Cu(NH_3)_4]^{2+}$, $[Ni(NH_3)_6]^{2+}$

Comprehension (Q.20 to Q.22)

The crystal field theory (C.F.T.)is now much more widely accepted than the valence bond theory. It assume that the attraction between the central metal and the ligands in a complex is purely electrostatic. According to C.F.T. ligands are treated as a point charge and crystal field splitting energy (CFSE) increases the thermodynamic stability of the complexes. Value of CFSE depends upon nature of ligand and a spectrochemical series has been made experimentally. For tetrahedral complexes, Δ is about 4/9 times to Δ_0 (CFSE for octahedral complexes).This energy lies in visible region and i.e. why electronic transition are responsible for colour.

71. The theory that can completely/properly explain the nature of bonding in $[Ni(CO)_4]$ is:

(1) Werner's theory (2) Valence bond theory **[JEE MAIN 2020]**

(3) Molecular orbital theory (4) Crystal field theory

7. **Statement-1**: Cis-isomer of $[Co(en)_2Cl_2]Cl$ shows optical activity.

Statement-2: Cis-isomer of $[Co(en)_2Cl_2]Cl$ is a symmetric molecule.

(A) Statement-1 is true, statement-2 is true and statement-2 is correct explanation for statement-1.

(B) Statement-1 is true, statement-2 is true and statement-2 is NOT the correct explanation for statement-1.

(C) Statement-1 is true, statement-2 is false.

(D) Statement-1 is false, statement-2 is true.

41. Among the following species the one which causes the highest CFSE, Δ_0 as a ligand is :-

[J-MAIN–2014, Online]

(1) CN^- (2) NH_3 (3) CO (4) F^-

Solid State:

4. The parameters of the unit cell of a substance are **[JEE Main, July 2021]**

$a = 2.5, b = 3.0, c = 4.0, \alpha = 90°, \beta = 120°, \gamma = 90°$.

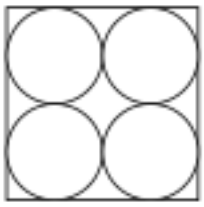
The crystal system of the substance is :

(A) Hexagonal (B) Orthorhombic

(C) Monoclinic (D) Triclinic

13. AgCl has the same structure as that of NaCl. The edge length of unit cell of AgCl is found to be 555 pm and the density of AgCl is 5.561 g cm^{-3}. Find the percentage of sites that are unoccupied.

1. Identical 4 spheres are taken and are arranged in a layer of square packing touching each other as shown



The percentage of vacant space is

(A) $100\left(1-\frac{3\pi}{8}\right)$ (B) $100\left(1-\frac{\pi}{6}\right)$ (C) $100-\frac{3\pi}{8}$ (D) $\frac{\pi}{6}$

26. In a solid "AB" having NaCl structure "A" atoms occupy the corners of the cubic unit cell. If all the face-centred atoms along one of the axes are removed, then the resultant stoichiometry of the solid is **[JEE-2000]**

(A) AB_2 (B) A_2B (C) A_4B_3 (D) A_3B_4

26. CsCl has the bcc arrangement and its unit cell edge length is 400 pm. Calculate the inter ionic distance in CsCl.

Functions:

1. Let

$$F(x)=\begin{bmatrix} x|x| & \text{if} & x\le -1 \\ [1+x]+[1-x] & \text{if} & -1<x<1 \\ -x|x| & \text{if} & x\ge 1 \end{bmatrix}$$

where [x] denotes the greatest integer function then F(x) is

(A) even (B) odd

(C) neither odd nor even (D) even as well as odd

25. Let S be the set of all real roots of the equation, $3^x(3^x-1)+2=|3^x-1|+|3^x-2|$. Then S:

[JEE - Main 2020]

(A) is a singleton (B) contains at least four elements.

(C) contains exactly two elements (D) is an empty set.

5. If $f(x)=|x+2|+|2x-p|+|x-2|$ attains its minimum value in the interval $(-1,1)$ then sum of all possible integral value of p is

(A) 0 (B) 1 (C) 3 (D) 4

PARAGRAPHBASED

Paragraph for question nos. 6&7

Let $f(x)=x^2-2x-1\forall x\in R$. Let f: $(-\infty,a]\to[b,\infty)$, where ' a ' is the largest real number for which f(x) is bijective.

1. If the equation $(p^2-4)(p^2-9)x^3+\left[\frac{p-2}{2}\right]x^2+(p-4)(p^2-5p+6)x+\{2p-1\}=0$ is satisfied by all values of x in (0,3] then sum of all possible integral values of ' p ' is

(A) 0 (B) 5 (C) 9 (D) 10

4. Let $f: R \to [1, \infty)$ be defined as

$f(x) = \log_{10}\left(\sqrt{3x^2 - 4x + k + 1} + 10\right)$. If $f(x)$ is surjective, then

(A) $k = \frac{1}{3}$ (B) $k < \frac{1}{3}$ (C) $k > \frac{1}{3}$ (D) $k = 1$