

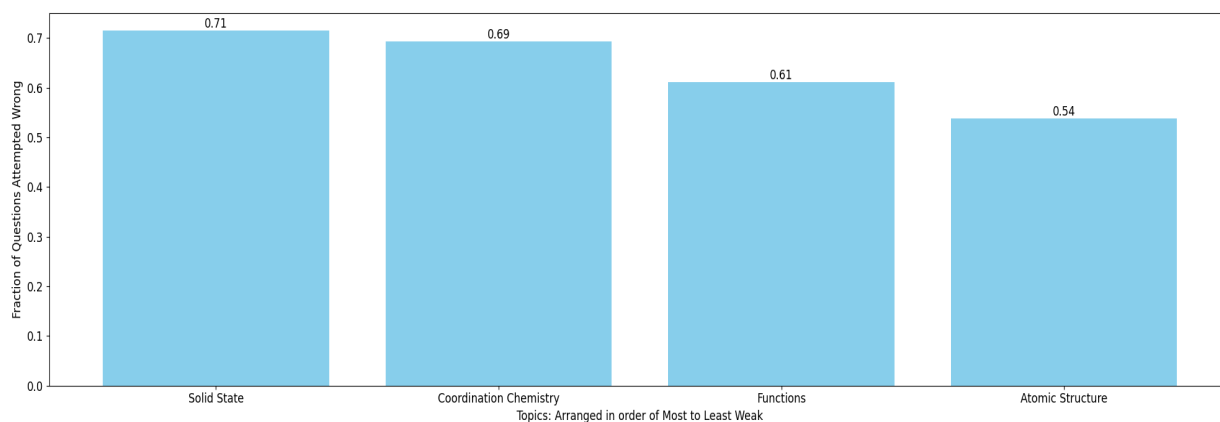
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MLAssist - Personalised DPP

Question Paper Analysis:



Weak Topic Analysis:



Practice Questions:

Solid State:

13. Consider the bcc unit cells of the solids 1 and 2 with the position of atoms as shown below. The radius of atom B is twice that of atom A. The unit cell edge length is 50% more in solid 2 than in
19. Which is incorrect for FCC lattice -
(A) $a\sqrt{2} = 4R$ (B) Co-ordination number = 12
(C) Void fraction = 0.32 (D) No of atoms per unit cell = 4
17. What is the number and closest distance between octahedral voids and tetrahedral voids in fcc unit cell?
44. The no. of atoms per unit cell in B.C.C. & F.C.C. is respectively: [AIEEE-02]
(A) 8, 10 (B) 2, 4 (C) 1, 2 (D) 1, 3
28. Which one of the following statements about packing in solids is **incorrect**? [Jee-Main (online)-13]
(A) Void space in ccp mode of packing is 26%
(B) Coordination number in hcp mode of packing is 12
(C) Void space in hcp mode of packing is 32%
(D) Coordination number in bcc mode of packing is 8
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Coordination Chemistry:

23. In the complex $\text{Fe}(\text{CO})_x$, the value of x is:
(A) 3 (B) 4 (C) 5 (D) 6

49. Which one of the following complexes shows optical isomerism :- [J-MAIN-2016]
- (1) $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]\text{Cl}$ (2) $[\text{Co}(\text{NH}_3)_3\text{Cl}_3]$
 (3) $\text{cis}[\text{Co}(\text{en})_2\text{Cl}_2]\text{Cl}$ (4) $\text{trans}[\text{Co}(\text{en})_2\text{Cl}_2]\text{Cl}$
 (en = ethylenediamine)

13. **Statement-1:** $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ is coloured while $[\text{Sc}(\text{H}_2\text{O})_6]^{3+}$ is colourless.
Statement-2: d-d transition is not possible in $[\text{Sc}(\text{H}_2\text{O})_6]^{3+}$ because no d-electron is present while possible for Ti^{3+} having d^1 system.
- (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.

Comprehension (Q.14 to Q.16)

Ligands are neutral or ionic species capable of donating at least one electron pair to central metal. Hence ligands can be of different denticities.

32. The pair(s) of coordination complex/ion exhibiting the same kind of isomerism is(are) – [JEE 2013]
- (A) $[\text{Cr}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$ and $[\text{Cr}(\text{NH}_3)_4\text{Cl}_2]\text{Cl}$ (B) $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]^+$ and $[\text{Pt}(\text{NH}_3)_2(\text{H}_2\text{O})\text{Cl}]^+$
 (C) $[\text{CoBr}_2\text{Cl}_2]^{2-}$ and $[\text{PtBr}_2\text{Cl}_2]^{2-}$ (D) $[\text{Pt}(\text{NH}_3)_3(\text{NO}_3)]\text{Cl}$ and $[\text{Pt}(\text{NH}_3)_3\text{Cl}]\text{Br}$
45. The geometries of the ammonia complexes of Ni^{2+} , Pt^{2+} and Zn^{2+} , respectively, are : [JEE Ad. 2016]
- (A) octahedral, square planar and tetrahedral
 (B) square planar, octahedral and tetrahedral
 (C) tetrahedral, square planar and octahedral
 (D) octahedral, tetrahedral and square planar

Functions:

21. Let $A = \{x \in \mathbb{R} : x \text{ is not a positive integer}\}$. Define a function $f: A \rightarrow \mathbb{R}$ as $f(x) = \frac{2x}{x-1}$, then f is

[JEE - Main 2019]

- (A) injective but not surjective (B) not injective
(C) surjective but not injective (D) neither injective nor surjective

(5)

5. Solve the following problems from (a) to (e) on functional equation.

- (a) The function $f(x)$ defined on the real numbers has the property that $f(f(x)) \cdot (1 + f(x)) = -f(x)$ for all x in the domain of f . If the number 3 is in the domain and range of f , compute the value of $f(3)$.
- (b) Suppose f is a real function satisfying $f(x + f(x)) = 4f(x)$ and $f(1) = 4$. Find the value of $f(21)$.
- (c) Let f be a function defined from $\mathbb{R}^+ \rightarrow \mathbb{R}^+$. If $[f(xy)]^2 = x(f(y))^2$ for all positive numbers x and y and $f(2) = 6$, find the value of $f(50)$.
- (d) Let f be a function such that $f(3) = 1$ and $f(3x) = x + f(3x - 3)$ for all x . Then find the value of $f(300)$.

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9. Let $f: \mathbb{R} \rightarrow (0,1)$ be a continuous function. Then, which of the following function(s) has(have) the value zero at some point in the interval $(0,1)$?

[JEE Ad. 2017]

- (A) $e^x - \int_0^x f(t) \sin t dt$ (B) $f(x) + \int_0^{\frac{\pi}{2}} f(t) \sin t dt$
(C) $x - \int_0^{\frac{\pi}{2}-x} f(t) \cos t dt$ (D) $x^9 - f(x)$

4. If $f(x) = -1 + |x - 2|, 0 \leq x \leq 4$ $g(x) = 2 - |x|, -1 \leq x \leq 3$

Then find $f \circ g(x)$ & $g \circ f(x)$. Draw rough sketch of the graphs of $f \circ g(x)$ & $g \circ f(x)$.

17. Let a function $f: (0, \infty) \rightarrow (0, \infty)$ be defined by $f(x) = \left|1 - \frac{1}{x}\right|$. Then, f is [JEE - Main 2019]

- (A) injective only (B) both injective as well as surjective
(C) not injective but it is surjective (D) neither injective nor surjective

Atomic Structure:

7. In a H-like sample electrons make transition from 5th excited state to 2nd excited state
 (A) 10 different spectral lines will be emitted
 (B) 6 different spectral lines will be emitted
 (C) Number of lines belonging to Balmer series will be 4
 (D) Number of lines belonging to Paschen series will be 3
39. A light source of wavelength λ illuminates a metal and ejects photo-electrons with $(K.E.)_{\max} = 1 \text{ eV}$
 Another light source of wavelength $\frac{\lambda}{3}$, ejects photo-electrons from same metal with $(K.E.)_{\max} = 4 \text{ eV}$. Find the value of work function ?
 (A) 1 eV (B) 2 eV (C) 0.5 eV (D) None of these
17. In which direct transition, one quantum of energy is emitted:
 (A) $n = 4 \rightarrow n = 2$ (B) $n = 3 \rightarrow n = 1$ (C) $n = 4 \rightarrow n = 1$ (D) All of them
20. The electrons identified by quantum numbers n and l : [AIEEE-2012]
 (a) $n = 4, l = 1$ (b) $n = 4, l = 0$ (c) $n = 3, l = 2$ (d) $n = 3, l = 1$
 Can be placed in order of increasing energy as
 (1) (a) < (c) < (b) < (d) (2) (c) < (d) < (b) < (a)
 (3) (d) < (b) < (c) < (a) (4) (b) < (d) < (a) < (c)
14. Choose the correct statement among the following
 (A) Radial distribution function ($\Psi^2 \cdot 4\pi r^2 dr$) give probability at a particular distance along one chosen direction
 (B) $\Psi^2(r)$ give probability density at a particular distance over a spherical surface
 (C) For 's' orbitals $\Psi(r)\Psi(\theta)\Psi(\phi) = \Psi(x, y, z)$ is independent of θ and ϕ
 (D) '2p' orbital with quantum numbers. $n = 2, l = 1, m = 0$, also shows angular dependence
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