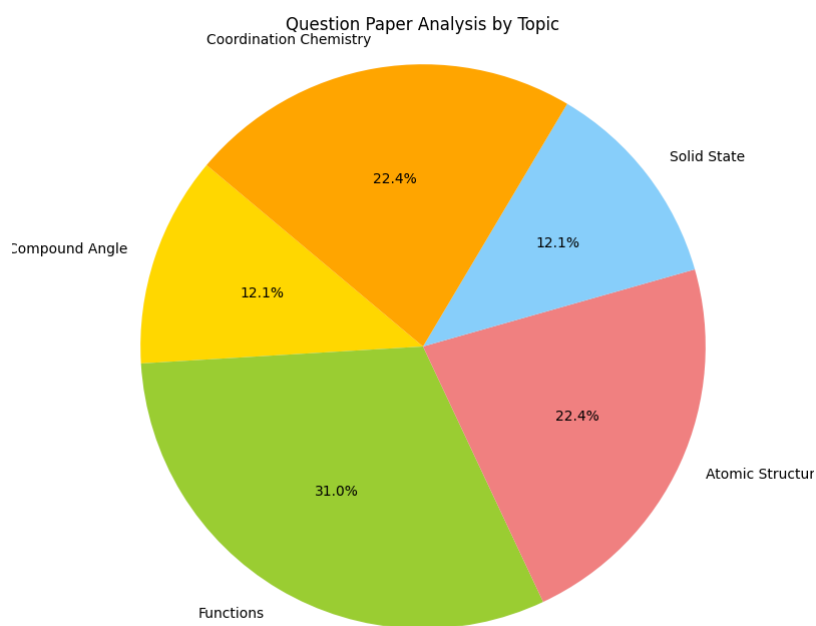
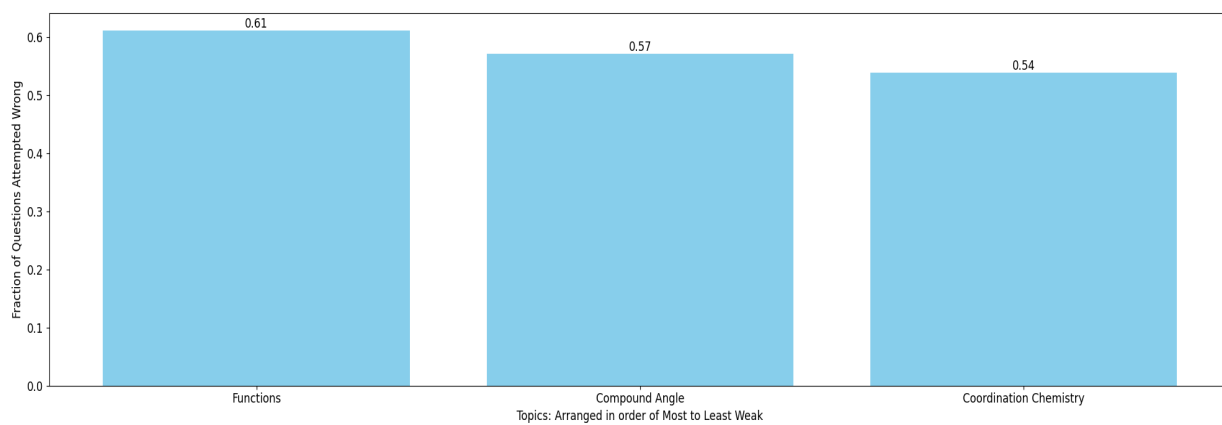


Akhil Total
MLAssist - Personalised DPP

Question Paper Analysis:



Weak Topic Analysis:



Practice Questions:

Functions:

8. Let 'f' be a function defined in $[-2, 3]$ given as $f(x) = \begin{cases} -(x-1), & 0 \leq x < 1 \\ 2(x-1)^2, & 1 \leq x < 2 \\ -x^2 + 4x - 3, & 2 \leq x \leq 3 \end{cases}$

List-I

List-II

- | | |
|---|-------|
| (P) The number of integers in the range of $f(x)$ is | (1) 2 |
| (Q) The number of integral values of x which are in the domain of $f(1 - x)$, is | (2) 4 |
| (R) The number of integers in the range of $ f(- x) $, is | (3) 6 |
| (S) The number of integral values of k for which the equation $f(x) = k$ has exactly four distinct solutions is | (4) 7 |

Code :

- | | |
|------------------------|------------------------|
| (A) P-3, Q-3, R-2, S-1 | (B) P-4, Q-4, R-2, S-1 |
| (C) P-3, Q-4, R-2, S-1 | (D) P-3, Q-4, R-2, S-2 |

20. Let N be the set of natural numbers and two functions f and g be defined as $f, g: N \rightarrow N$ such

that $f(n) = \begin{cases} \frac{n+1}{2}; & \text{if } n \text{ is odd} \\ \frac{n}{2}; & \text{if } n \text{ is even} \end{cases}$ and $g(n) = n - (-1)^n$. Then, $f \circ g$ is **[JEE - Main 2019]**

- | | |
|---------------------------|------------------------------|
| (A) one-one but not onto | (B) onto but not one-one |
| (C) both one-one and onto | (D) neither one-one nor onto |

2. The function $f(x)$ is defined by $f(x) = \cos^4 x + K \cos^2 2x + \sin^4 x$, where K is a constant. If the function $f(x)$ is a constant function, the value of k is

- | | | | |
|--------|------------|-------|-----------|
| (A) -1 | (B) $-1/2$ | (C) 0 | (D) $1/2$ |
|--------|------------|-------|-----------|

$$\sqrt[3]{9}$$

39. The relation $R = \{(a, b) : \gcd(a, b) = 1, 2a \neq b, a, b \in \mathbb{Z}\}$ is : **[JEE - Main 2023]**
 (A) Reflexive but not symmetric (B) Transitive but not reflexive
 (C) Symmetric but not transitive (D) Neither symmetric nor transitive
30. The real valued function $f(x) = \frac{\cos ec x}{\sqrt{x - [x]}}$, where $[x]$ denotes the greatest integer less than or equal to x , is defined for all x belonging to **[JEE - Main 2021]**
 (A) all reals except integers (B) all non-integers except the interval $[-1, 1]$
 (C) all integers except $0, -1, 1$ (D) all reals except the Interval $[-1, 1]$

Compound Angle:

20. (a) If $A + B + C = \pi$; prove that $\tan^2 \frac{A}{2} + \tan^2 \frac{B}{2} + \tan^2 \frac{C}{2} \geq 1$.
 (b) Prove that the triangle ABC is equilateral iff, $\cot A + \cot B + \cot C = \sqrt{3}$.

16. Calculate without using trigonometric tables:

(a) $4\cos 20^\circ - \sqrt{3}\cot 20^\circ$

(b) $\frac{2\cos 40^\circ - \cos 20^\circ}{\sin 20^\circ}$

(c) $\cos^6 \frac{\pi}{16} + \cos^6 \frac{3\pi}{16} + \cos^6 \frac{5\pi}{16} + \cos^6 \frac{7\pi}{16}$

(d) $\tan 10^\circ - \tan 50^\circ + \tan 70^\circ$

9. Prove that:

(a) $\tan 20^\circ \cdot \tan 40^\circ \cdot \tan 60^\circ \cdot \tan 80^\circ = 3$

(b) $\tan 9^\circ - \tan 27^\circ - \tan 63^\circ + \tan 81^\circ = 4$.

(c) $\sin^4 \frac{\pi}{16} + \sin^4 \frac{3\pi}{16} + \sin^4 \frac{5\pi}{16} + \sin^4 \frac{7\pi}{16} = \frac{3}{2}$

$\frac{\pi}{8} \quad \frac{3\pi}{8} \quad \frac{5\pi}{8} \quad \frac{7\pi}{8}$

4. The smallest positive value of x (in radians) satisfying the equation

$$(\sin x)(\cos^3 x) - (\cos x)(\sin^3 x) = \frac{1}{4}, \text{ is}$$

- (A) $\frac{\pi}{4}$ (B) $\frac{\pi}{8}$ (C) $\frac{\pi}{12}$ (D) $\frac{\pi}{15}$

8. Prove that: $\tan \alpha + 2 \tan 2\alpha + 4 \tan 4\alpha + 8 \cot 8\alpha = \cot \alpha$.

Coordination Chemistry:

7. Which of the following statement(s) is/are **incorrect**?
 (A) The state of hybridisation of central atom of anionic part of solid PBr_5 is sp^3d^2 .
 (B) $[\text{Co}(\text{NH}_3)_6]^{2+}$ ion is easily oxidisable while $[\text{Co}(\text{NO}_2)_6]^{4-}$ is not.
 (C) Bis(glycinato)zinc(II) is optically active.
 (D) d_{x^2} orbital of central metal atom / ion is used in dsp^2 hybridisation.
90. Total number of relatively more stable isomer(s) possible for octahedral complex $[\text{Cu}(\text{en})_2(\text{SCN})_2]$ will be _____. [JEE MAIN 2022]

Ans. (3)

6. Ammonia forms the complex ion $[\text{Cu}(\text{NH}_3)_4]^{2+}$ with copper ions in alkaline solutions but not in acidic solution. What is the reason for it :- [AIEEE-2003]
 (1) In acidic solutions hydration protects copper ions
 (2) In acidic solutions protons coordinate with ammonia molecules forming NH_4^+ ions and NH_3 molecules are not available
 (3) In alkaline solutions insoluble $\text{Cu}(\text{OH})_2$ is precipitated which is soluble in excess of any alkali
 (4) Copper hydroxide is an amphoteric substance

7. **Statement-1:** Cis-isomer of $[\text{Co}(\text{en})_2\text{Cl}_2]\text{Cl}$ shows optical activity.
Statement-2: Cis-isomer of $[\text{Co}(\text{en})_2\text{Cl}_2]\text{Cl}$ 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.
38. An octahedral complex of Co^{3+} is diamagnetic. The hybridisation involved in the formation of the complex is : **[J-MAIN-2014]**
(1) d^2sp^3 (2) dsp^3d (3) dsp^2 (4) sp^3d^2
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