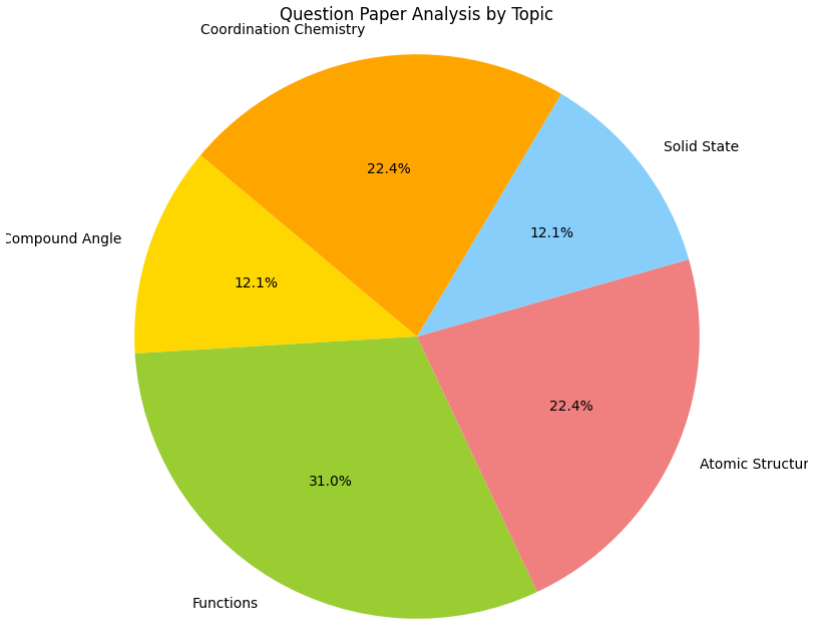
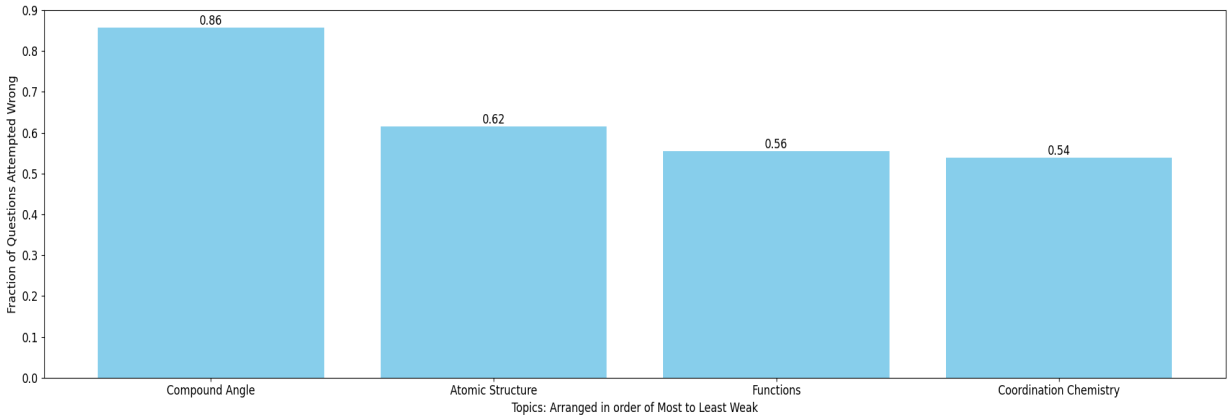
Yashwanth Total
MLAssist - Personalised DPP

Question Paper Analysis:



Weak Topic Analysis:



Practice Questions:

Compound Angle:

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

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

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

8. If $\frac{\sin^7 x}{2} + \frac{\cos^7 x}{3} = \frac{1}{5^7}$, then **[JEE 2009, 4]**

(A) $\tan^2 x = \frac{2}{3}$ (B) $\frac{\sin^8 x}{8} + \frac{\cos^8 x}{27} = \frac{1}{125}$ (C) $\tan^2 x = \frac{1}{3}$ (D) $\frac{\sin^8 x}{8} + \frac{\cos^8 x}{27} = \frac{2}{125}$

1. If $m\tan(\theta - 30^\circ) = n\tan(\theta + 120^\circ)$, show that $\cos 2\theta = \frac{m+n}{2(m-n)}$.

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 , $\cot A + \cot B + \cot C = \sqrt{3}$.

8. The minimum value of the expression $\frac{9x^2\sin^2 x + 4}{x \sin x}$ for $x \in (0, \pi)$ is

(A) $\frac{16}{3}$ (B) 6 (C) 12 (D) $\frac{8}{3}$

Atomic Structure:

54. If the work function of a metal is $6.63 \times 10^{-}$J, the maximum wavelength of the photon required to remove a photoelectron from the metal is _____nm. (Nearest integer) [Given: h =

23. The wave number of the first emission line in the Balmer series of H-Spectrum is : (R = Rydberg constant) :

(1) $\frac{3}{4}$ R (2) $\frac{9}{400}$ R (3) $\frac{5}{36}$ R (4) $\frac{7}{6}$ R

43. An electron in a hydrogen atom in its ground state absorbs energy equal to the ionisation energy of Li^{+2}. The wavelength of the emitted electron is:

(A) 3.32×10^{-10} m (B) 1.17 Å (C) 2.32×10^{-9} nm (D) 3.33 pm

21. The ground state energy of hydrogen atom is –13.6 eV. Consider an electronic state Ψ of He^{+} whose energy; azimuthal quantum number and magnetic quantum number are –3.4 eV, 2 and 0, respectively. Which of the following statement(s) is(are) true for the state Ψ? **[JEE Adv. 2019]**

(1) It has 2 angular nodes

(2) It has 3 radial nodes

(3) The nuclear charge experienced by the electron in this state is less than 2e, where e is the magnitude of the electronic charge

(4) It is a 4d state.

46. An electron has kinetic energy 2.8×10^{-23} J. de-Broglie wavelength will be nearly :-

($m_e = 9.1 \times 10^{-31}$ kg)

(A) 9.28×10^{-24} m (B) 9.28×10^{-7} m (C) 9.28×10^{-8} m (D) 9.28×10^{-10} m

Functions:

10. Let $f(x) = a^x (a > 0)$ be written as $f(x) = f_1(x) + f_2(x)$, where $f_1(x)$ is an even function and $f_2(x)$ is an odd function. Then $f_1(x+y) + f_1(x-y)$ equals **[JEE - Main 2019]**

(A) $2f_1(x+y) \cdot f_2(x-y)$ (B) $2f_1(x+y) \cdot f_1(x-y)$

(C) $2f_1(x) \cdot f_2(y)$ (D) $2f_1(x) \cdot f_1(y)$

12. Let $f(x)x^2, x \in R$. For any $A \subseteq R$, define $g(A) = \{x \in R: f(x) \in A\}$. If $S = [0,4]$, then which one of the following statemetns is not true? **[JEE - Main 2019]**

(A) $f(g(S)) = S$ (B) $g(f(f)) \neq S$ (C) $g(f(S)) = g(S)$ (D) $f(g(S)) = f(S)$

9. Let a function f defined from $R \to R$ as

$$f(x) = \begin{cases} x + p^2, & \text{for } x \leq 2 \\ px + 5, & \text{for } x > 2 \end{cases}$$

If the function is surjective, then find the sum of all possible integral values of p in $[-100,100]$.

20. Let N be the set of natural numbers and two functions f and g be defined as $f, g: N \longrightarrow N$ such that $f(n) = \begin{cases} \frac{n+1}{2}; & \text{if n is odd} \\ \frac{n}{2}; & \text{if n is even} \end{cases}$ and $g(n) = n - (-1)^n$. Then, fog 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

4. The value of $f(-89) - f(-67) + f(46)$ is equal to

(A) 4 (B) 5 (C) 6 (D) 7

MULTIPLE CORRECT TYPE

Coordination Chemistry:

37. The formula of the complex hydridotrimethoxidoborate(III) ion is:

(A) $[BH(OCH_3)_3]^{2-}$ (B) $[BH_2(OCH_3)_3]^{2-}$ (C) $[BH(OCH_3)_3]^{-}$ (D) $[BH(OCH_3)_3]^{+}$

2. In the complexes $[Fe(H_2O)_6]^{3+}$, $[Fe(SCN)_6]^{3-}$, $[Fe(C_2O_4)_3]^{3-}$ and $[FeCl_6]^{3-}$, more stability is shown by - **[AIEEE-2002]**

(1) $[Fe(H_2O)_6]^{3+}$ (2) $[Fe(SCN)_6]^{-3}$ (3) $[Fe(C_2O_4)_3]^{3-}$ (4) $[FeCl_6]^{3-}$

78. Oxidation number of Fe in violet coloured complex $Na_4[Fe(CN)_5(NOS)]$ is:

(A) 0 (B) 2 (C) 3 (D) 4

15. The IUPAC name of $[Ni(NH_3)_4]^{+2}[NiCl_4]^{-2}$ is **[JEE 2008]**

(A) Tetrachloronickel (II)-tetraamminenickel (II)

(B) Tetraamminenickel (II)-tetrachloronickel (II)

(C) Tetraamminenickel (II)-tetrachloronickelate (II)

(D) Tetrachloronickel (II)-tetraamminenickelate (0)

30. Which of the following complex ions will exhibit optical isomerism? **[J-MAIN–2012, Online]**

(en = 1, 2-diamine ethane)

(1) $[Co(en)_2Cl_2]^+$ (2) $[Zn(en)_2]^{2+}$

(3) $[Co(NH_3)_4Cl_2]^+$ (4) $[Cr(NH_3)_2Cl_2]^+$