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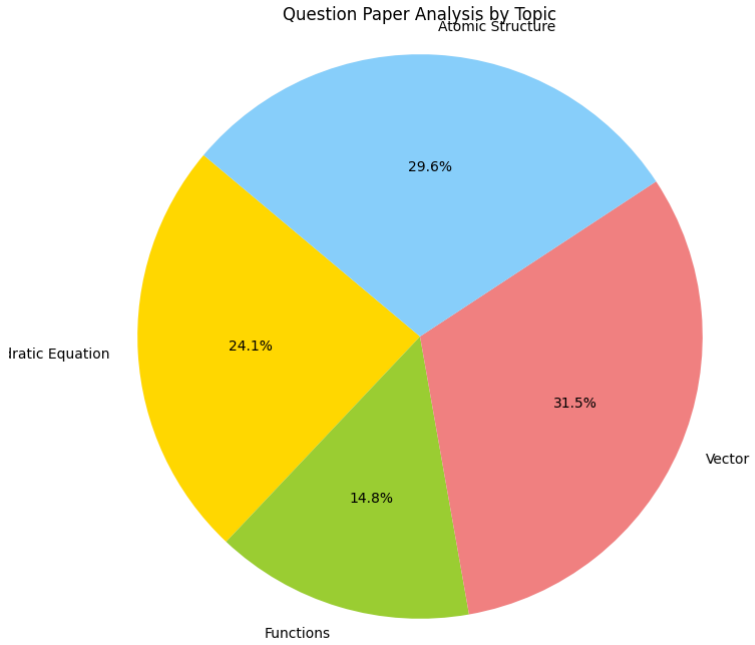
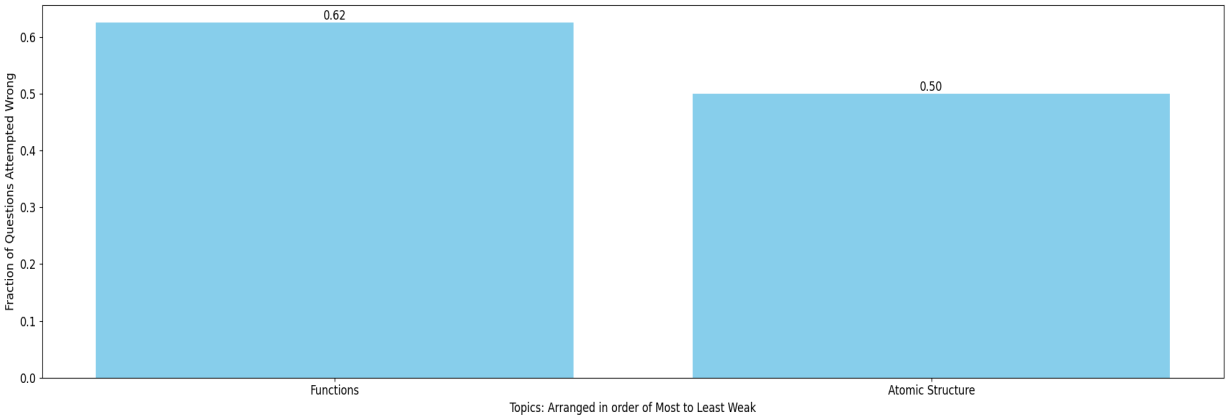
Question Paper Analysis:



Weak Topic Analysis:



Practice Questions:

Functions:

5. Consider, $f(x) = (x^2 - 1)^{1/3}$ for $x < 0$, $g(x) = -(x^3 + 1)^{1/2}$ for $x > -1$

Identify which of the following statement(s) is(are) correct.

(A) The range of $f(f(x))$ is $(-1,0)$.

(B) The domain of $g(g(x))$ is $(-1,0)$.

(C) $f^{-1}og^{-1}(x) = x \forall x \in (-\infty, 0)$.

(D) $g^{-1}of^{-1}(x) = x \forall x \in (-1, \infty)$.

36. For $p, q \in R$, consider the real valued function $f(x) = (x - p)^2 - q$, $x \in R$ and $q > 0$. Let a_1, a_2, a_3 and a_4 be in an arithmetic progression with mean p and positive common difference. If $|f(a_i)| = 500$ for all I = 1, 2, 3, 4, then the absolute difference between the roots of $f(x) = 0$ is: **[JEE - Main 2022]**

37. Let a function $f : N \to N$ be defined by. **[JEE - Main 2022]**

$$f(x) = \begin{cases} 2n, & n = 2,4,6,8,..... \\ n-1, & n = 3,7,11,15,..... \\ \frac{n+1}{2}, & n = 1,5,9,13,..... \end{cases}$$ then f is

(A) One-one but not onto

(B) Onto but not one-one

(C) Neither one-one nor onto

(D) one-one and onto

10. Consider, $f(x) = \{x + [\log_2 (2 + x)]\} +$

$$\{x + [\log_2 (2 + x^2)]\} + \cdots .. + \{x + [\log_2 (2 + x^{10})]\}$$

Identify the correct statement(s)

(A) $[f(e)] = 7$.

(B) $f(\pi) = 20\pi - 60$.

(C) the number of solutions of the equation $f(x) = x$ is 9 .

(D) the number of solutions of the equation $f(x) = x$ is 10 .

[Note : $\{y\}$ and $[y]$ denotes the fractional part function and greatest integer function respectively.]

INTEGERTYPE

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

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

MULTIPLE CORRECT TYPE

Atomic Structure:

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.

21. In an atom, two electrons move round the nucleus in circular orbits of radii R and 4R. The ratio of the time taken by them to complete one revolution is: (Consider Bohr model to be valid)

(A) 1 : 4 (B) 4 : 1 (C) 1 : 8 (D) 8 : 1

38. Which of the following statement is true in the context of photoelectric effect ?

(A) The kinetic energy of ejected electron is independent of the intensity of a radiation.

(B) The number of photoelectrons ejected depends upon the intensity of the incident radiation.

(C) The kinetic energy of the emitted electrons depends on the frequency of the incident radiation.

(D) All of these

2. Select the correct statement(s):

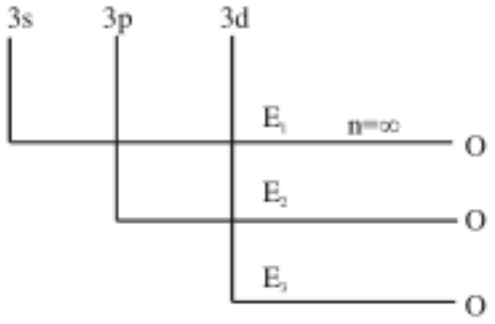
(A) All electromagnetic radiation travel with speed of light in vacuum.

(B) Energy of photon of UV light is lower than that of yellow light.

(C) He^+ and H have similar spectrum.

(D) The total energy of an electron in uni electronic specie is greater than zero

62. For H atom, the energy required for the removal of electron from various sub-shells is given as under:-



The order of the energies would be :-

(A) $E_1 > E_2 > E_3$ (B) $E_3 > E_2 > E_1$ (C) $E_1 = E_2 = E_3$ (D) None of these