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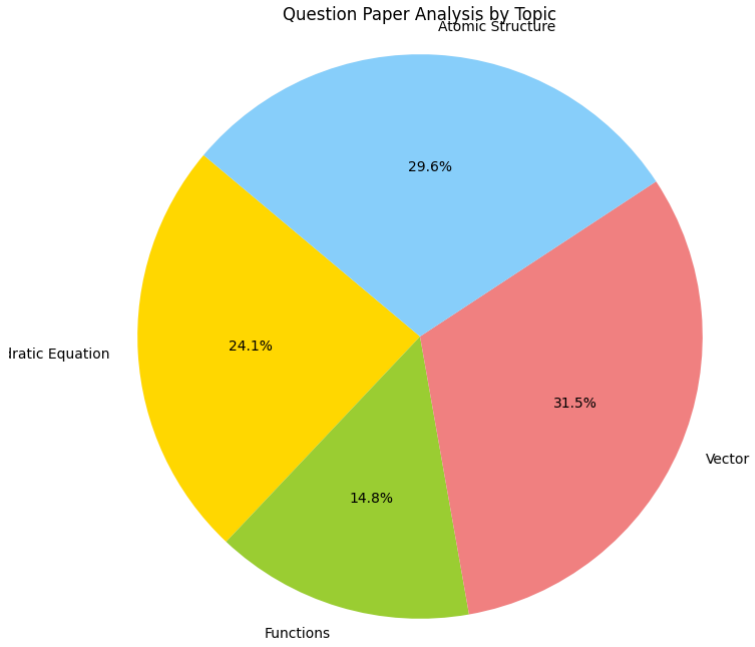
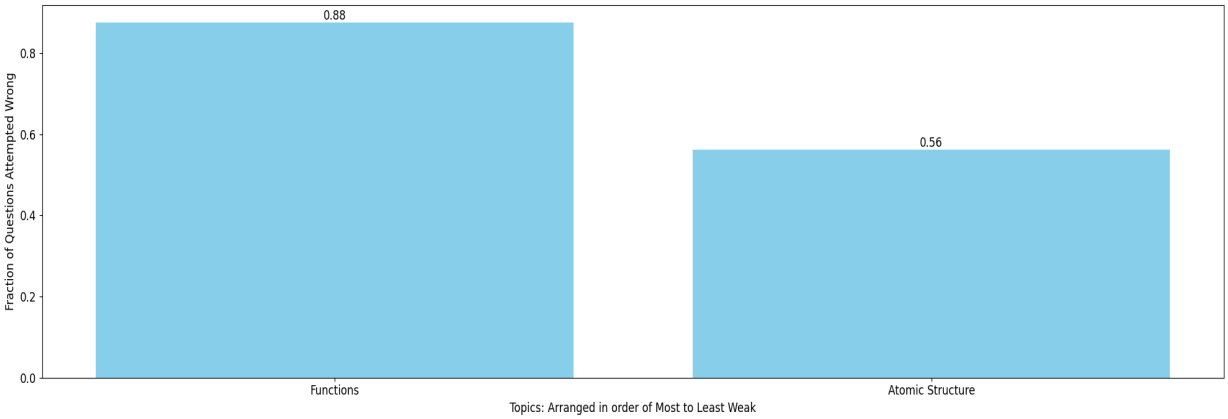
Question Paper Analysis:



Weak Topic Analysis:



Practice Questions:

Functions:

6. Suppose $f(x) = \sin x$ and $g(x) = 1 - \sqrt{x}$. Then find the domain and range of the following functions.

(a) fog (b) gof (c) fof (d) gog

2. The sum of all different values of λ for which the equation $4\lambda[x]^2 = \lambda + 12$ has a solution in $[1, \infty)$, is

[Note : [k] denotes greatest integer less than or equal to k.]

(A) 8 (B) 3 (C) 4 (D) 6

PARAGRAPH BASED

Paragraph for question nos. 3 & 4

Let f be an even function satisfying $f(x-2) = f\left(x + \left[\frac{6x^2+13}{x^2+2}\right]\right) \forall x \in R$

and $f(x) = \begin{cases} 3x, & 0 \le x < 1 \\ 4 - x, & 1 \le x \le 4 \end{cases}$

[Note : [y] denotes greatest integer function of y.]

8. Let $P(x) = x^4 + ax^3 + bx^2 + cx + d$, where $a, b, c, d \in R$. Suppose $P(0) = 6, P(1) = 7, P(2) = 8$ and $P(3) = 9$, then find the value of $P(4)$.

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

14. The period of the function

$$f(x) = \left(\sec^2\left(\frac{\pi x}{10}\right) - \tan^2\left(\frac{\pi x}{10}\right)\right)^{\cos^4 4\pi x + 100\{x\}}$$

(where {.}denotesfractionalpartfunction)isλ, then (λ/2) is equal to

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Atomic Structure:

37. A photon of energy hν is absorbed by a free electron of a metal having work function w < hν. Then :

(A) The electron is sure to come out

(B) The electron is sure to come out with a kinetic energy (hν – w)

(C) Either the electron does not come out or it comes with a kinetic energy (hν – w)

(D) It may come out with a kinetic energy less than (hν – w)

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16. The energy required to break one mole of Cl–Cl bonds in Cl_2 is 242 kJ mol^{-1}. The longest wavelength of light capable of breaking a single Cl–Cl bond is

($C = 3 \times 10^8$ ms^{-1} and $N_A = 6.02 \times 10^{23}$ mol^{-1}) **[AIEEE-2010]**

(1) 494 nm (2) 594 nm (3) 640 nm (4) 700 nm

50. An electron in a hydrogen like atom makes transition from a state in which its de-Broglie wavelength is λ_1 to a state where its de-Broglie wavelength is λ_2 then wavelength of photon (λ) generated will be

(A) $\lambda = \lambda_1 - \lambda_2$

(B) $\lambda = \frac{4mc}{h}\left\{\frac{\lambda_1^2\lambda_2^2}{\lambda_1^2 - \lambda_2^2}\right\}$

(C) $\lambda = \left\{\frac{\lambda_1^2\lambda_2^2}{\lambda_1^2 - \lambda_2^2}\right\}$

(D) $\lambda = \frac{2mc}{h}\left\{\frac{\lambda_1^2\lambda_2^2}{\lambda_1^2 - \lambda_2^2}\right\}$

1. The approximate size of the nucleus of $^{64}_{28}Ni$ is :

(A) 3 fm (B) 4 fm (C) 5 fm (D) 2 fm

19. For He^+ ion, the only INCORRECT combination is

(A) (II) (ii) (Q)v (B) (I) (i) (S) (C) (I) (i) (R) (D) (I) (iii) (R)