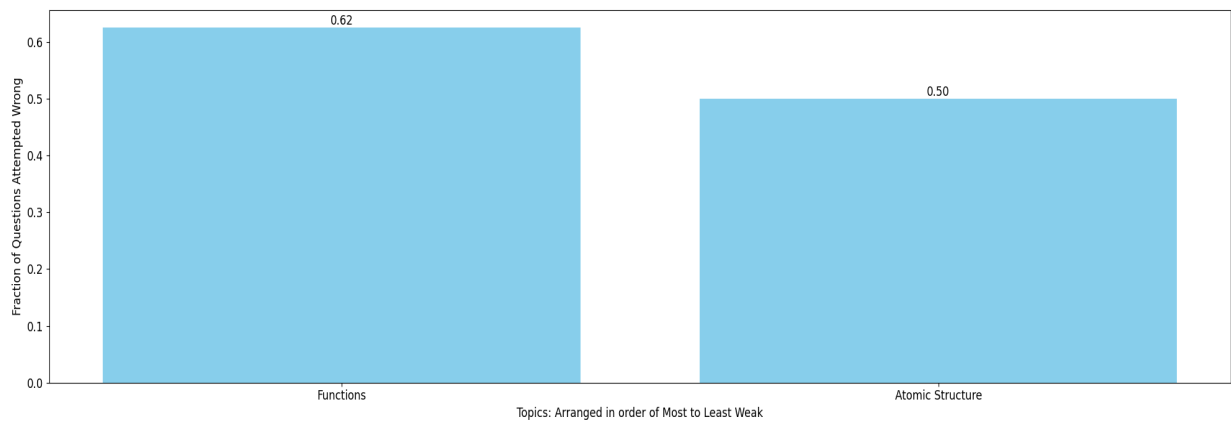


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Question Paper Analysis:



Weak Topic Analysis:



## Practice Questions:

### Functions:

- (a) Let  $P(x) = x^6 + ax^5 + bx^4 + cx^3 + dx^2 + ex + f$  be a polynomial such that  $P(1) = 1; P(2) = 2; P(3) = 3; P(4) = 4; P(5) = 5$  and  $P(6) = 6$  then find the value of  $P(7)$ .

(b) Let  $a$  and  $b$  be real numbers and let  $f(x) = a \sin x + b \sqrt[3]{x} + 4, \forall x \in \mathbb{R}$ .  
If  $f(\log_{10}(\log_3 10)) = 5$  then find the value of  $f(\log_{10}(\log_{10} 3))$ .
- If  $f(x) = \sqrt[3]{\frac{x}{\log_2(3-2x)}} - 1$  then the value of ' $a$ ' which satisfies  $f^{-1}(2a-4) = \frac{1}{2}$ , is

(A) 4                      (B) 3                      (C) 2                      (D) 1
- Let  $f: \mathbb{R} \rightarrow \mathbb{R}$ , then range of values of  $k$  for which equation  $f(|x|) = k$  has 4 distinct real roots is

(A)  $(-2, -1)$               (B)  $(-2, 0)$               (C)  $(-1, 0)$               (D)  $(0, 1)$

### MATCH THE COLUMN

$$\begin{cases} 3(x+1)^{1/3}, & -2 \leq x < 0 \\ -(x-1)^2 & 0 < x < 1 \end{cases}$$

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

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.]

### INTEGRITY

8. Let  $f(x) = x^2 + \frac{1}{x^2}$  and  $g(x) = x - \frac{1}{x}, x \in \mathbb{R} - \{-1, 0, 1\}$ .

If  $h(x) = \frac{f(x)}{g(x)}$ , then the local minimum value of  $h(x)$  is

[JEE - Main 2018]

- (A) -3 (B)  $-2\sqrt{2}$  (C)  $2\sqrt{2}$  (D) 3

### Atomic Structure:

19. For  $\text{He}^+$  ion, the only INCORRECT combination is

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

24. For  $\text{He}^+$ , a transition takes place from the orbit of radius 105.8 pm to the orbit of radius 26.45 pm. The wavelength (in nm) of the emitted photon during the transition is \_\_\_\_.

[Use: Bohr's radius,  $a = 52.9$  pm]

[JEE Adv. 2023]

Rydberg constant,  $R_H = 2.2 \times 10^{-18} \text{ J}$

Planck's constant,  $h = 6.6 \times 10^{-34} \text{ Js}$

Speed of light,  $c = 3 \times 10^8 \text{ ms}^{-1}$

9. A photon of energy 12.75 eV is completely absorbed by a hydrogen atom initially in ground state. The principle quantum number of the excited state is

- (A) 1 (B) 3 (C) 4 (D)  $\infty$

4. A bulb of 40 W is producing a light of wavelength 620 nm with 80% of efficiency then the number of photons emitted by the bulb in 20 seconds are ( $1\text{eV} = 1.6 \times 10^{-19} \text{ J}$ ,  $hc = 12400 \text{ eV } \text{\AA}$ )

- (A)  $2 \times 10^{18}$  (B)  $10^{18}$  (C)  $10^{21}$  (D)  $2 \times 10^{21}$

### Bohrs Model

36. The ground state energy of hydrogen atom is  $-13.6$  eV. The energy of second excited state  $\text{He}^+$  ion in eV is : **[JEE Main (Jan.) 2019]**
- (1)  $-54.4$                       (2)  $-6.04$                       (3)  $-3.4$                       (4)  $-27.2$
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