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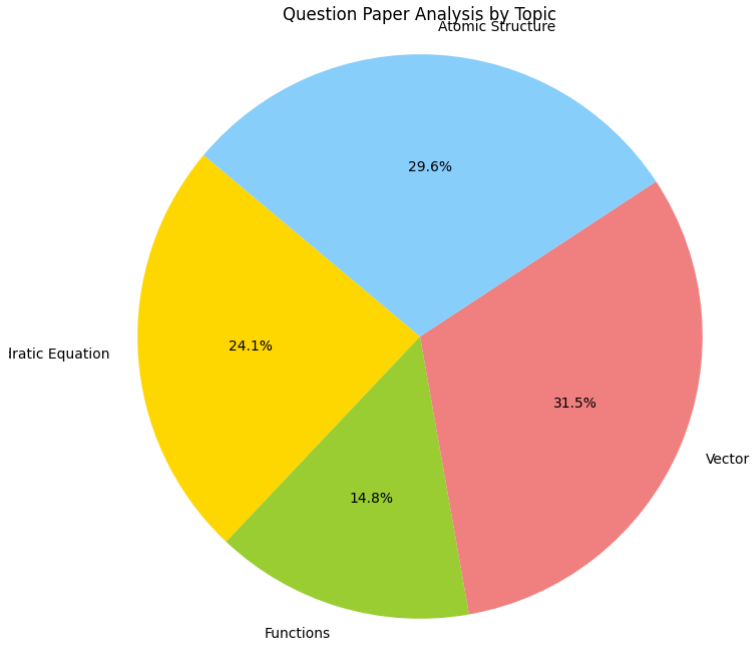
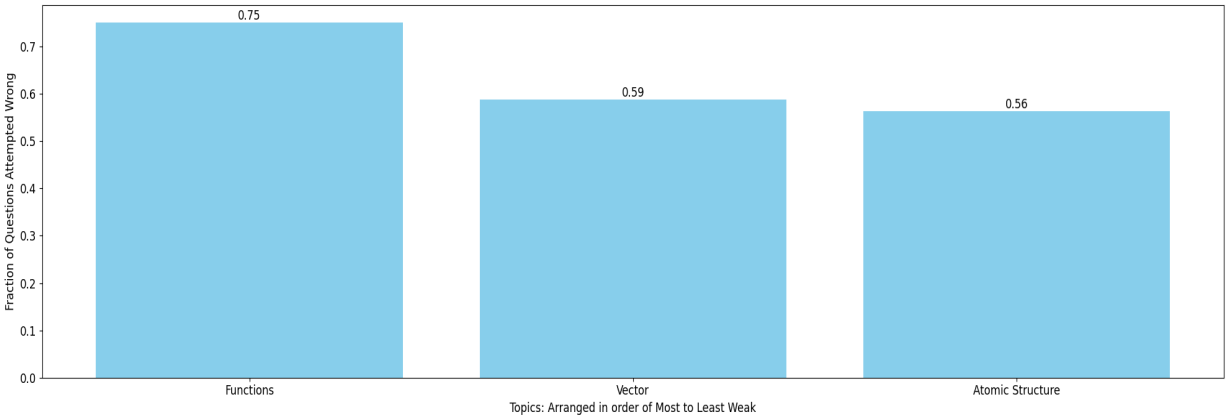
Question Paper Analysis:



Weak Topic Analysis:



Practice Questions:

Functions:

5. Let f: $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right) \to R$ be given by $f(x) = (\log(\sec x + \tan x))^3$. Then, **[JEE Ad. 2014]**

(A) f(x) is an odd function (B) f(x) is a one-one function

(C) f(x) is an onto function (D) f(x) is an even function

6. Let $f(x) = \frac{3}{2} + \sqrt{x - \frac{1}{4}}$ and g(x) be the inverse function of f(x) then the value of $(f^{-1}og^{-1})(17)$ is equal to

(A) $\frac{3+\sqrt{61}}{2}$ (B) 242 (C) 17 (D) $\frac{3-\sqrt{61}}{2}$

16. If the function f: $\mathbf{R} - \{1, -1\} \to A$ defined by $f(x) = \frac{x^2}{1-x^2}$, is surjective, then A is equal to **[JEE - Main 2019]**

(A) $\mathbf{R} - \{-1\}$ (B) $[0, \infty)$ (C) $\mathbf{R} - [-1,0)$ (D) $\mathbf{R} - (-1,0)$

4. Let f: $[0, a] \to S$ be a function defined by $f(x) = 3\cos\frac{x}{2}$. If the largest value of a for which f(x) has

6. The value of (a + b) is equal to

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

Vector:

49. Let $\vec{a} = a_1\hat{i} + a_2\hat{j} + a_3\hat{k}$; $\vec{b} = b_1\hat{i} + b_2\hat{j} + b_3\hat{k}$; $\vec{c} = c_1\hat{i} + c_2\hat{j} + c_3\hat{k}$ be three non-zero vectors such that $\vec{c}$ is a unit vector perpendicular to both $\vec{a}$ & $\vec{b}$. If the angle between $\vec{a}$ & $\vec{b}$ is $\frac{\pi}{6}$, then

$$\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}^2 =$$

(A) 0 (B) 1

(C) $\frac{1}{4}(a_1^2 + a_2^2 + a_3^2)(b_1^2 + b_2^2 + b_3^2)$ (D) $\frac{3}{4}(a_1^2 + a_2^2 + a_3^2)(b_1^2 + b_2^2 + b_3^2)(c_1^2 + c_2^2 + c_3^2)$

42. If the vectors,

$\vec{p} = (a+1)\hat{i} + a\hat{j} + a\hat{k}$,

$\vec{q} = a\hat{i} + (a+1)\hat{j} + a\hat{k}$ and

$\vec{r} = a\hat{i} + a\hat{j} + (a+1)\hat{k}$ $(a \in R)$ are coplanar and $3(\vec{p}\cdot\vec{q})^2 - \lambda|\vec{r}\times\vec{q}|^2 = 0$ then value of λ is .....

[JEE (Main)-2020]

61. If $\vec{a} = \hat{i} + \hat{j} + \hat{k}$ and $\vec{b} = \hat{i} - 2\hat{j} + \hat{k}$, then the vector $\vec{c}$ such that $\vec{a}.\vec{c} = 2$ & $\vec{a}\times\vec{c} = \vec{b}$ is -

(A) $\frac{1}{3}\left(3\hat{i} - 2\hat{j} + 5\hat{k}\right)$ (B) $\frac{1}{3}\left(-\hat{i} + 2\hat{j} + 5\hat{k}\right)$ (C) $\frac{1}{3}\left(\hat{i} + 2\hat{j} - 5\hat{k}\right)$ (D) $\frac{1}{3}\left(3\hat{i} + 2\hat{j} + \hat{k}\right)$

22. Which of the following statement(s) is/are true in respect of the lines

$\vec{r} = \vec{a} + \lambda\vec{b}; \vec{r} = \vec{c} + \mu\vec{d}$ where $\vec{b}\times\vec{d} \neq 0$

(A) acute angle between the lines is $\cos^{-1}\left(\frac{|\vec{b}\cdot\vec{d}|}{|\vec{b}||\vec{d}|}\right)$

(B) The lines would intersect if $[\vec{c}\ \vec{b}\ \vec{d}] = [\vec{a}\ \vec{b}\ \vec{d}]$

(C) The lines will be skew if $[\vec{c} - \vec{a}\ \vec{b}\ \vec{d}] \neq 0$

(D) If the lines intersect at $\vec{r} = \vec{r}_0$, then the equation of the plane containing the lines is $[\vec{r} - \vec{r}_0\ \vec{b}\ \vec{d}] = 0$

20. Let A(1, 2, 3), B(0, 0, 1), C(–1, 1, 1) are the vertices of a ΔABC.

(i) The equation of internal angle bisector through A to side BC is

(A) $\vec{r} = \hat{i}+2\hat{j}+3\hat{k}+\mu\ (3\hat{i}+2\hat{j}+3\hat{k})$ (B) $\vec{r} = (\hat{i}+2\hat{j}+3\hat{k})+\mu(3\hat{i}+4\hat{j}+3\hat{k})$

(C) $\vec{r} = \hat{i}+2\hat{j}+3\hat{k}+\mu\ (3\hat{i}+3\hat{j}+2\hat{k})$ (D) $\vec{r} = \hat{i}+2\hat{j}+3\hat{k}+\mu\ (3\hat{i}+3\hat{j}+4\hat{k})$

(ii) The equation of median through C to side AB is

(A) $\vec{r} = -\hat{i}+\hat{j}+\hat{k}+p\ (3\hat{i}-2\hat{k})$ (B) $\vec{r} = -\hat{i}+\hat{j}+\hat{k}+p\ (3\hat{i}+2\hat{k})$

(C) $\vec{r} = -\hat{i}+\hat{j}+\hat{k}+p\ (-3\hat{i}+2\hat{k})$ (D) $\vec{r} = -\hat{i}+\hat{j}+\hat{k}+p\ (3\hat{i}+2\hat{j})$

(iii) The area (ΔABC) is equal to

(A) $\frac{9}{2}$ (B) $\frac{\sqrt{17}}{2}$ (C) $\frac{17}{2}$ (D) $\frac{7}{2}$

Atomic Structure:

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)

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48. In the sixth period, the orbitals that are filled are: **[JEE Main (April) 2020]**

(1) 6s, 5d, 5f, 6p (2) 6s, 4f, 5d, 6p

(3) 6s, 6p, 6d, 6f (4) 6s, 5f, 6d, 6p

13. The ionziation enthalpy of hydrogen atom is 1.312×10^6 J mol^{-1}. The energy required to excite the electron in the atom from n =1 to n =2 is **[AIEEE-2008]**

(1) 8.51×10^5 J mol^{-1} (2) 6.56×10^5 J mol^{-1} (3) 7.56×10^5 J mol^{-1} (4) 9.84×10^5 J mol^{-1}

18. The binding energy of e– in ground state of hydrogen atom is 13.6 eV. The energies required to eject out an electron from three lowest states of He^+ ion will be – (in eV)

(A) 13.6, 10.2, 3.4 (B) 13.6, 3.4, 1.5 (C) 13.6, 27.2, 40.8 (D) 54.4, 13.6, 6

52. A ball weighing 10 g is moving with a velocity of 90 ms^{-1}. If the uncertainty in its velocity is 5%, then the uncertainty in its position is_____ $\times 10^{-m}$ m. (Rounded off to the nearest integer)

[Given: $h = 6.63 \times 10^{-}$Js]

[JEE Main (April) 2021]

Ans. 1