# Anubhab Ray Total
## MLAssist - Personalised DPP

## Question Paper Analysis:

### Question Paper Analysis by Topic
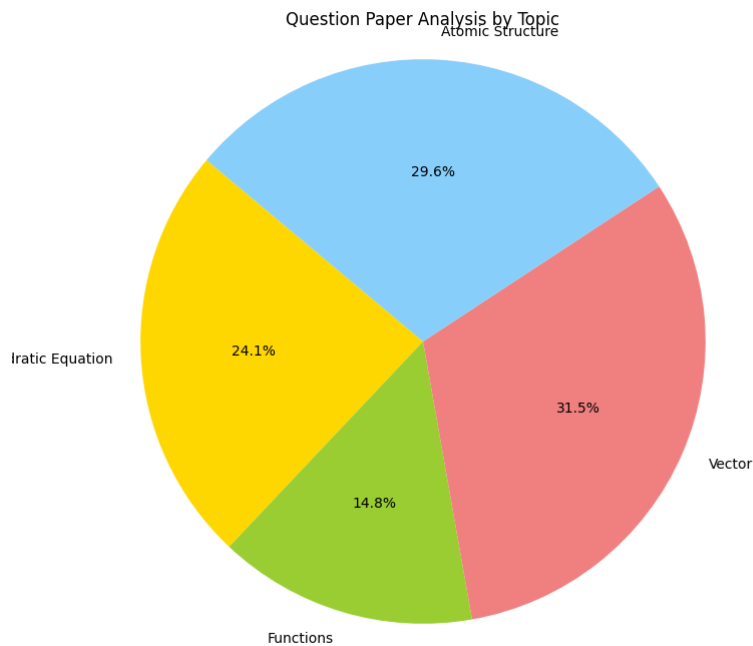


## Weak Topic Analysis:
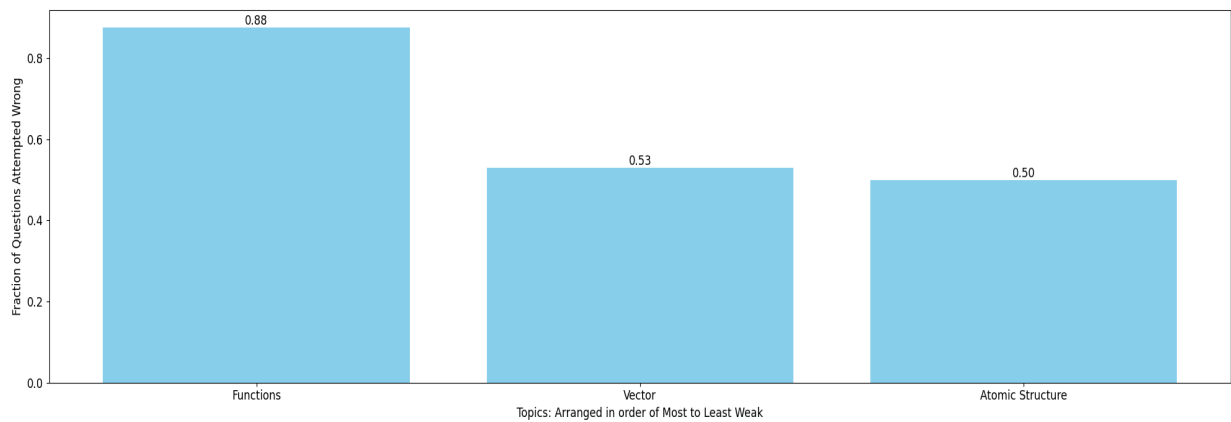
## Practice Questions:

### Functions:

**7.** If range of $f(x) = \dfrac{2\sin^2 x + 2\sin x + 3}{\sin^2 x + \sin x + 1}$ is $[p, q]$ then $6p - 3q$ equals

$2F(n)+1$                                  $F(101)$

**1.** Let $f(x) = x^2$ and $g(x) = \sin x$ for all $x \in R$. Then the set of all $x$ satisfying $(fogogof)(x) = (gogof)(x)$, where $(fog)(x) = f(g(x))$, is-  **[JEE 2011]**

(A) $\pm\sqrt{n\pi}, n \in \{0,1,2, ....$

(B) $\pm\sqrt{n\pi}, n \in \{1,2, ... \}$

(C) $\dfrac{\pi}{2} + 2n\pi, n \in \{...., -2, -1, 0, 1, 2, ....$

(D) $2n\pi, n \in \{...., -2, -1, 0, 1, 2, .....$

**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 $P(4)$.

**9.** Let $f(x) = \left\lfloor \dfrac{1}{\cos \{x\}} \right\rfloor$ where $[y]$ and $\{y\}$ denote greatest integer and fractional part functions respectively and $g(x) = 2x^2 - 3x(k + 1) + k(3k + 1)$. If $g(f(x)) < 0 \forall x \in R$ then find the number of integral values of $k$.

$(1+x)$

**11.** For $x \in \left(0, \dfrac{3}{2}\right)$, let $f(x) = \sqrt{x}, g(x) = \tan x$ and $h(x) = \dfrac{1-x}{1+x^2}$. If $\phi(x) = (\,hof\,) \circ g)(x)$, then $\phi\left(\dfrac{\pi}{3}\right)$ is equal to **[JEE - Main 2019]**

(A) $\tan \dfrac{\pi}{12}$          (B) $\tan \dfrac{11\pi}{12}$          (C) $\tan \dfrac{7\pi}{12}$          (D) $\tan \dfrac{5\pi}{12}$

### Vector:

**6.** If the distance from the point P(1, 1, 1) to the line passing through the points Q(0, 6, 8) and R(–1, 4, 7) is expressed in the form $\sqrt{p/q}$ where p and q are coprime, then the value of $\dfrac{(p+q)(p+q-1)}{2}$.

**4.** In a ΔABC, points E and F divide sides AC and AB respectively so that $\dfrac{AE}{EC} = 4$ and $\dfrac{AF}{FB} = 1$. Suppose D is a point on side BC. Let G be the intersection of EF and AD and suppose D is situated so that $\dfrac{AG}{GD} = \dfrac{3}{2}$. If the ratio $\dfrac{BD}{DC} = \dfrac{a}{b}$, where a and b are in their lowest form, find the value of (a + b).

**59.** Position vectors of the four angular points of a tetrahedron ABCD are A(3, – 2, 1); B(3, 1, 5); C(4, 0, 3) and D(1, 0, 0). Acute angle between the plane faces ADC and ABC is
(A) $\tan^{-1}(5/2)$      (B) $\cos^{-1}(2/5)$      (C) $\operatorname{cosec}^{-1}(5/2)$      (D) $\cot^{-1}(3/2)$

**22.** The pv's of the four angular points of a tetrahedron are $A\left(\hat{j}+2\hat{k}\right)$; $B\left(3\hat{i}+\hat{k}\right)$; $C\left(4\hat{i}+3\hat{j}+6\hat{k}\right)$ & $D\left(2\hat{i}+3\hat{j}+2\hat{k}\right)$. Find :
(i) the perpendicular distance from A to the line BC.
(ii) the volume of the tetrahedron ABCD.
(iii) the perpendicular distance from D to the plane ABC.
(iv) the shortest distance between the lines AB & CD.

**12.** The acute angle between the medians drawn from the acute angles of an isosceles right angled triangle is:
(A) $\cos^{-1}(2/3)$      (B) $\cos^{-1}(3/4)$      (C) $\cos^{-1}(4/5)$      (D) none

**Atomic Structure:**

**20.** 

| Column-I | | Column-I | |
|---|---|---|---|
| (A) Electron moving in $2^{nd}$ orbit in $He^+$ ion | | (P) | Radius of orbit in which electron is moving is $0.529\,\text{Å}$ |
| (B) Electron moving in $3^{rd}$ orbit in H-atom | | (Q) | Total energy of electron is $(-)13.6 \times 9\,eV$ |
| (C) Electron moving in $1^{st}$ orbit in $Li^{+2}$ ion | | (R) | Velocity of electron is |

**40.** If the de Broglie wavelength of the electron in nth Bohr orbit in a hydrogenic atom is equal to

**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 _____ $\times 10^{-\text{m}}$. (Rounded off to the nearest integer)

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

**[JEE Main (April) 2021]**

**Ans. 1**

**35.** Which of the graphs shown below does not represent the relationship between incident light and the electron ejected from metal surface? **[JEE Main (Jan.) 2019]**



(1)

(2)

(3)

(4)
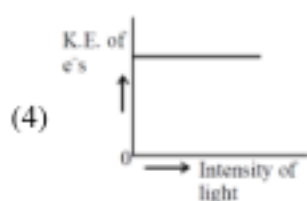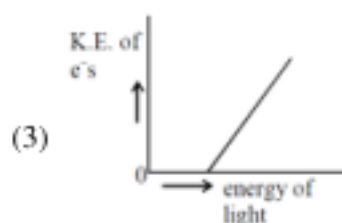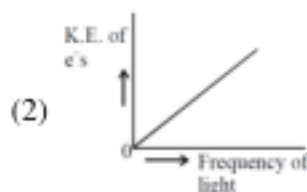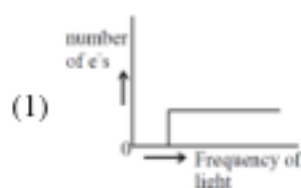
**7.** Given in hydrogenic atom $r_n$, $V_n$, E, $K_n$ stand for radius, potential energy, total energy and kinetic energy in $n^{th}$ orbit. Find the value of U,v,x,y. **[JEE 2006]**

| | | | |
|---|---|---|---|
| (A) | $U = \dfrac{V_n}{K_n}$ | (P) | 1 |
| (B) | $\dfrac{1}{r_n} \propto E^x$ | (Q) | $-2$ |
| (C) | $r_n \propto Z^y$ (Z = Atomic number) | (R) | $-1$ |
| (D) | v = (Orbital angular momentum of electron in its lowest energy ) | (S) | 0 |