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(45) $\lambda = \frac{h}{\sqrt{2 m_p q V}}$

$\lambda = \sqrt{\frac{150}{1840 V}}$

(49) ——6

——3

(44)

$m_p = 1840\, m_e$

(47) $\lambda_1 = \sqrt{\frac{150}{100}}$

$\lambda_2 = \sqrt{\frac{150}{81}}$

$\lambda_3 = \sqrt{\frac{150}{49}}$

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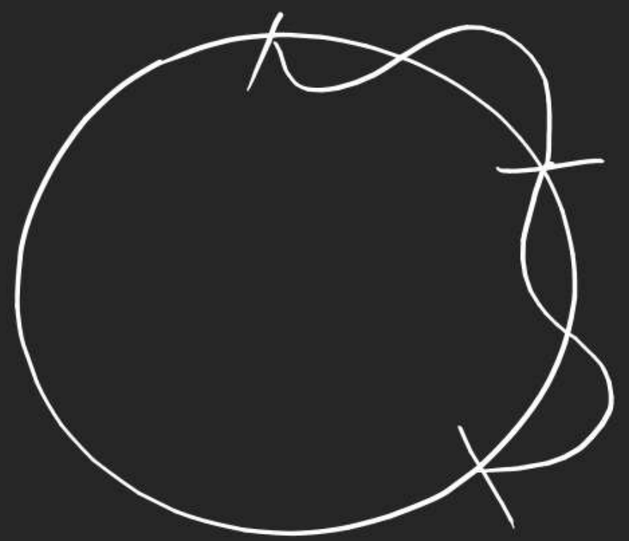
(51) $$v = \frac{1}{10} \times 3 \times 10^8$$

$$\Delta v = \left(\frac{1}{10} \times 3 \times 10^8\right) \frac{1}{1\omega}$$



(52) $$\Delta x \cdot \Delta p = \frac{h}{4\pi} = (\Delta x)^2$$

$$\Delta x \cdot \Delta v = \frac{h}{4\pi m}$$

$$\Delta v = \left(\frac{h}{4\pi}\right)^{1/2} \times \frac{1}{m}$$

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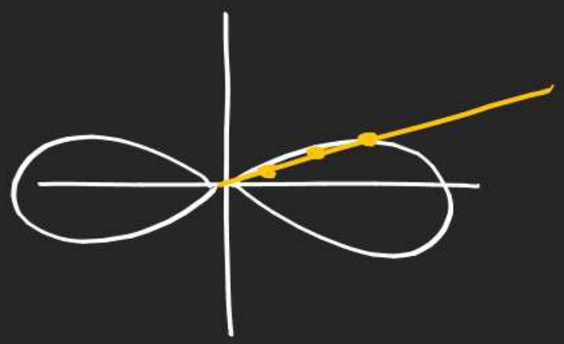
n, l, m

1, 0, 0

(2, 1, 0)



Orbital

ψ r, θ, ϕ

$\psi = R(r) \cdot f(\theta, \phi)$

Radial part

(n, l) (l, m)

x − 1

$x^2 - 1$

$x^2 - x - 2$

Variation of Radial Part [R(r)] with r

$$R(r) = C\left(\frac{1}{a_0}\right)^{3/2} \sigma^{l} \cdot e^{-\sigma/2} \cdot (\text{polynomial of } r \text{ of order } n-l-1)$$

$$\sigma = \frac{2r}{n a_0}$$

$$\sigma_{1s} = \frac{2r}{a_0}$$

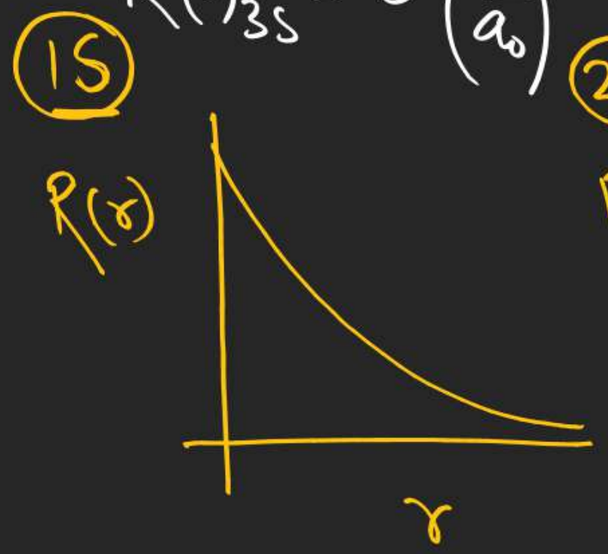
$$\sigma_{2s} = r/a_0$$

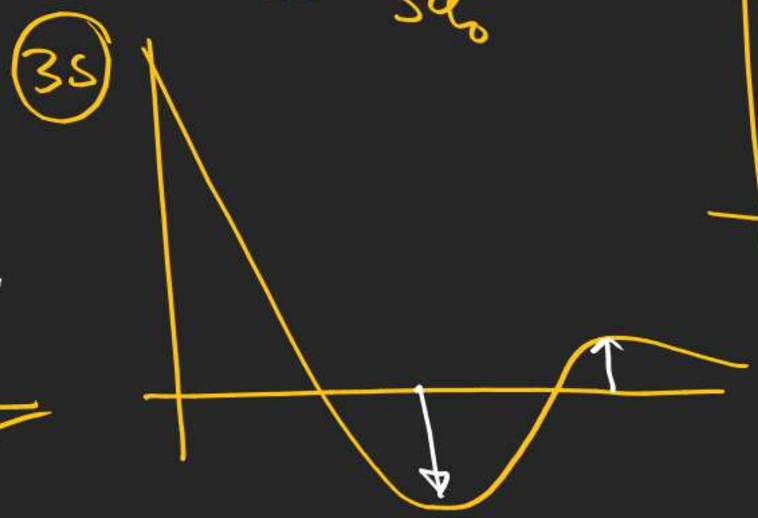
$$\sigma_{3s} = \frac{2r}{3a_0}$$

$$\rightarrow R(r)_{1s} = 2\left(\frac{1}{a_0}\right)^{3/2} e^{-r/a_0}$$

$$R(r)_{2s} = \frac{1}{2\sqrt{2}}\left(\frac{1}{a_0}\right)^{3/2} e^{-r/2a_0} (2-\sigma)$$

$$R(r)_{3s} = C\left(\frac{1}{a_0}\right)^{3/2} e^{-\sigma/2} (\text{Quadratic})$$





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$$R(r)_{2p} = C\left(\frac{1}{a_0}\right)^{3/2} \sigma\, e^{-\sigma/2}\,(1)$$

$$\sigma_{2p} = \frac{2r}{2a_0} = r/a_0$$

$$R(r)_{2p} = C\left(\frac{1}{a_0}\right)^{3/2}\left(\frac{r}{a_0}\right) e^{-r/2a_0}$$

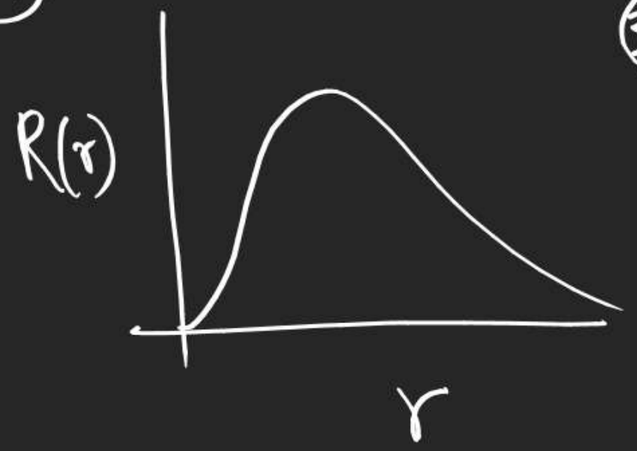
$n-l-1$

$2-1-1=0$

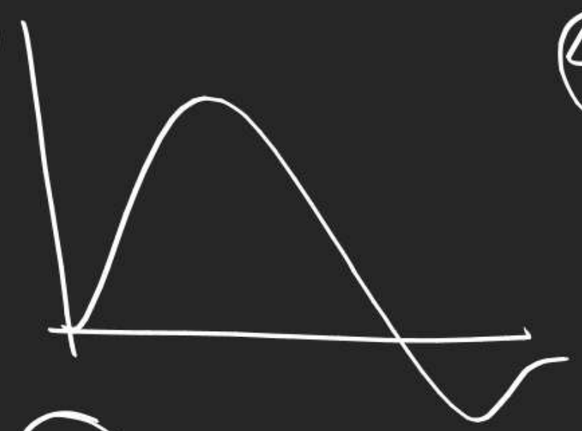
$$R(r)_{3p} = C\left(\frac{1}{a_0}\right)^{3/2} \sigma\, e^{-\sigma/2}\,(\text{linear})$$

$$\sigma_{3p} = \frac{2r}{3a_0}$$

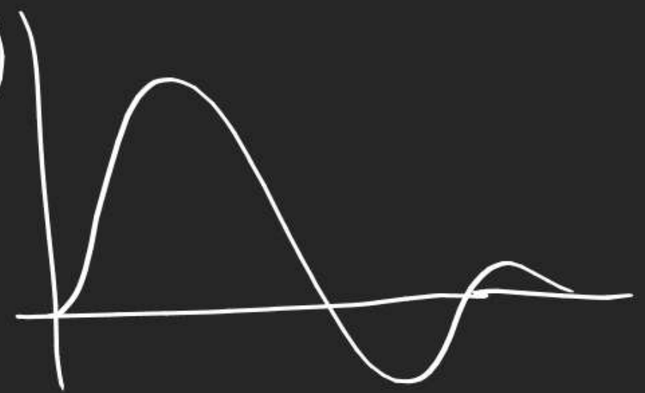
(2p)



(3p)



(4p)



(3p) $3-1-1=1$

$4-1-1=2$

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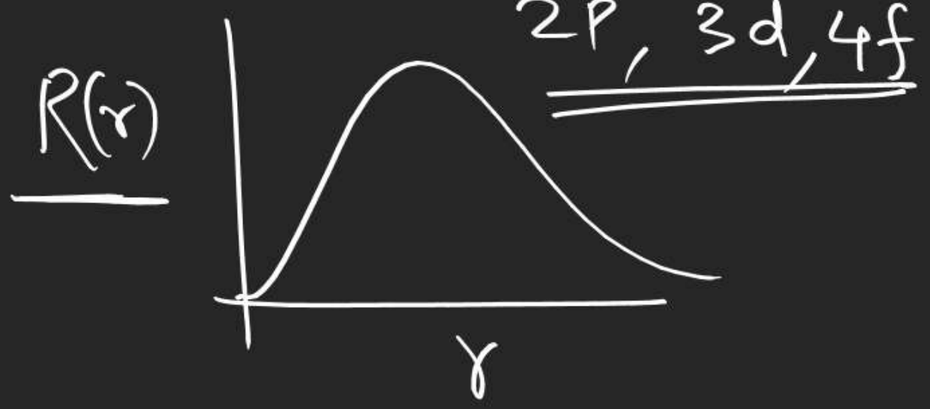
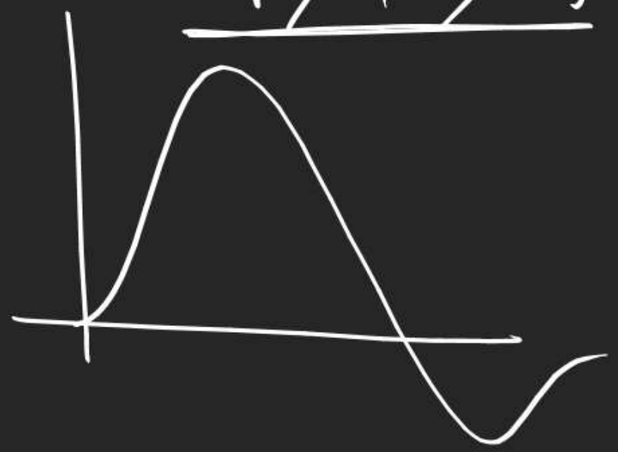
$$R(r)_{3d} = C\left(\frac{1}{a_0}\right)^{3/2} \sigma^2 e^{-\sigma/2}$$

1s	2p	3d	4f
2s	3p	4d	5f

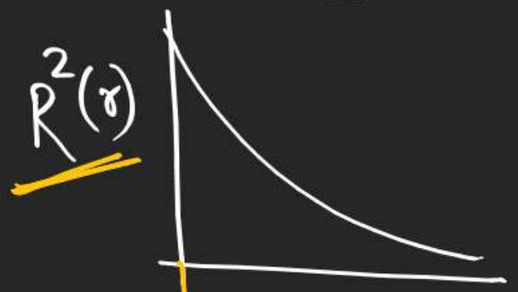
$$R(r)_{4d} = C\left(\frac{1}{a_0}\right)^{3/2} \sigma^2 e^{-\sigma/2} \text{ (linear)}$$



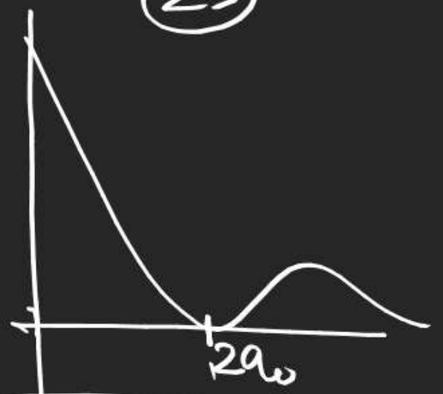


$R^2(r)$ vs r

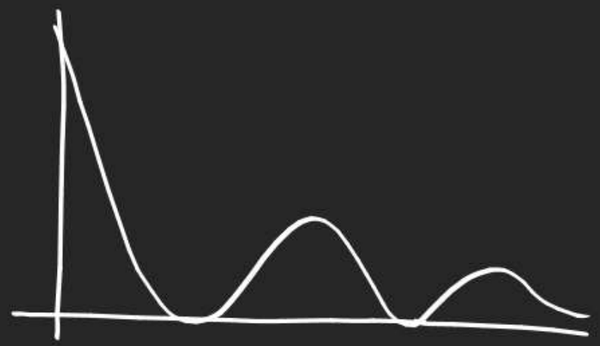
(1S)



(2S)

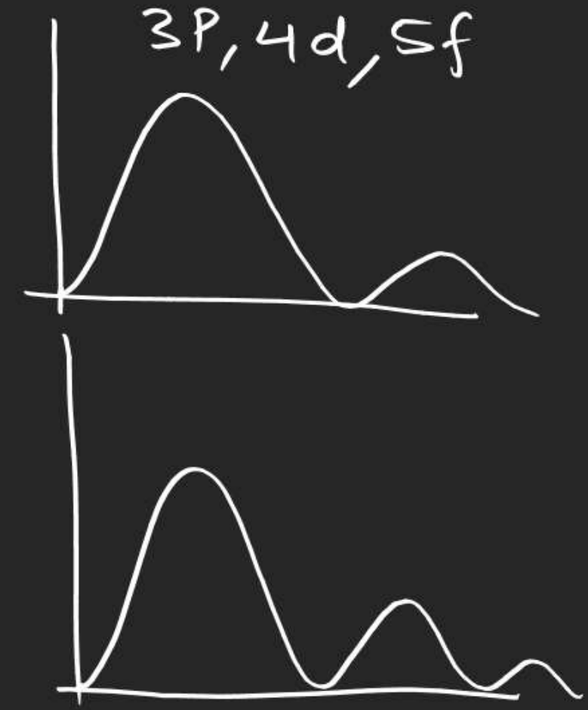


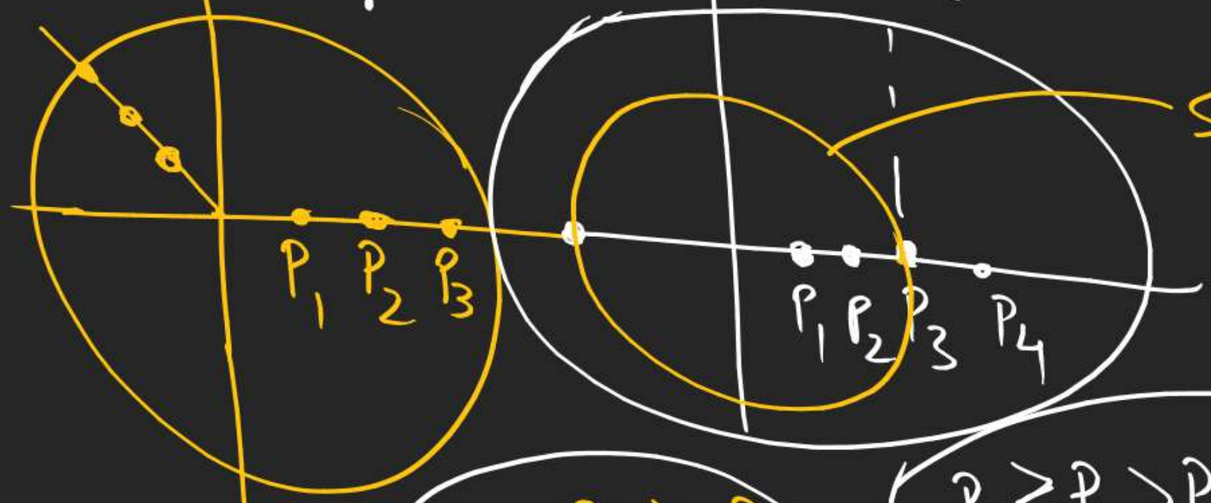
(3S)



2P, 3d, 4f

3P, 4d, 5f



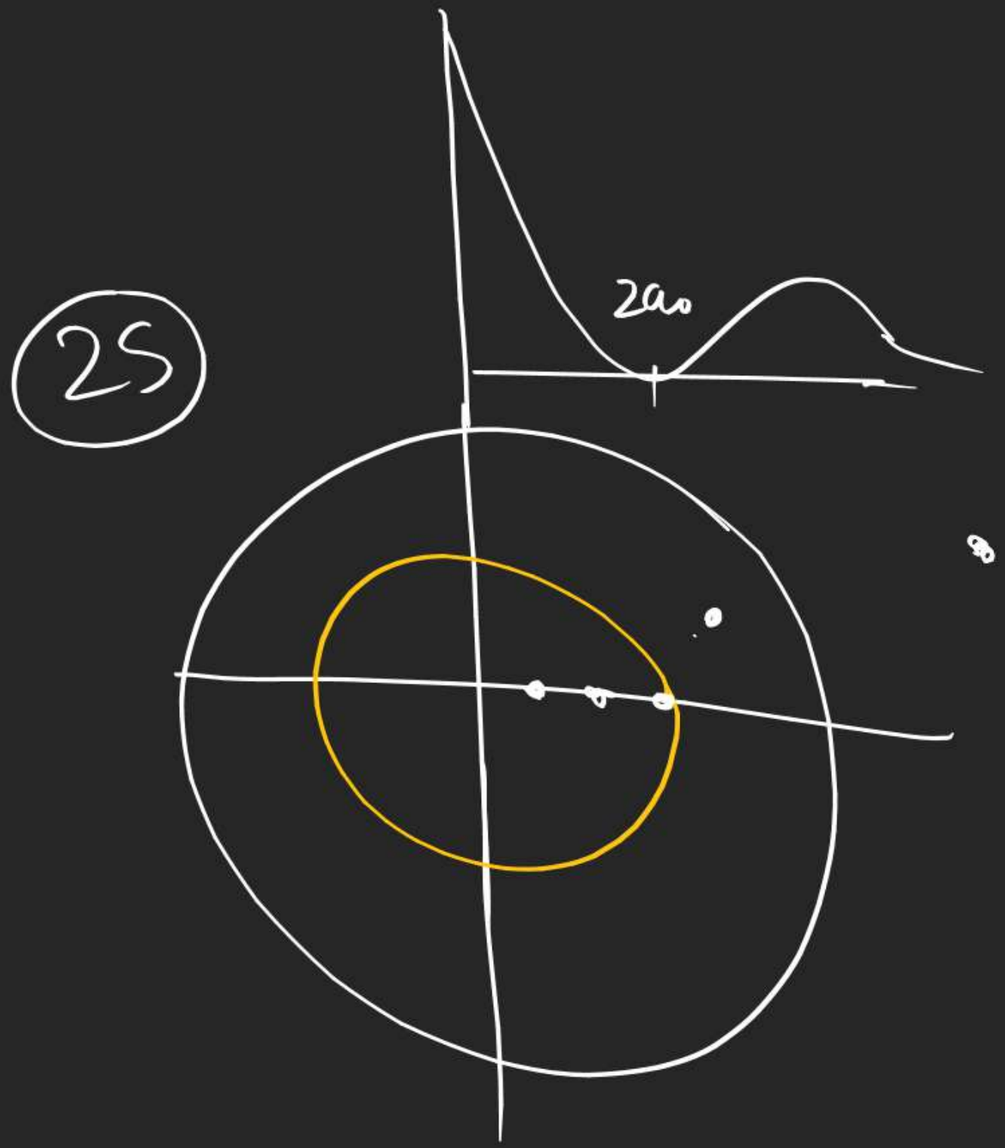


Spherical node
or
Radial node

$P_1 > P_2 > P_3$

$P_1 > P_2 > P_3 < P_4$

$P_3 = 0$



or Radial node

no. of spherical node

$= n - l - 1$

→ R(r) vs r

→ $R^2(r)$ vs r

⟹

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JEE-Adv

7, 13, 14, 15, 23, 24, 26

S-II 11-18

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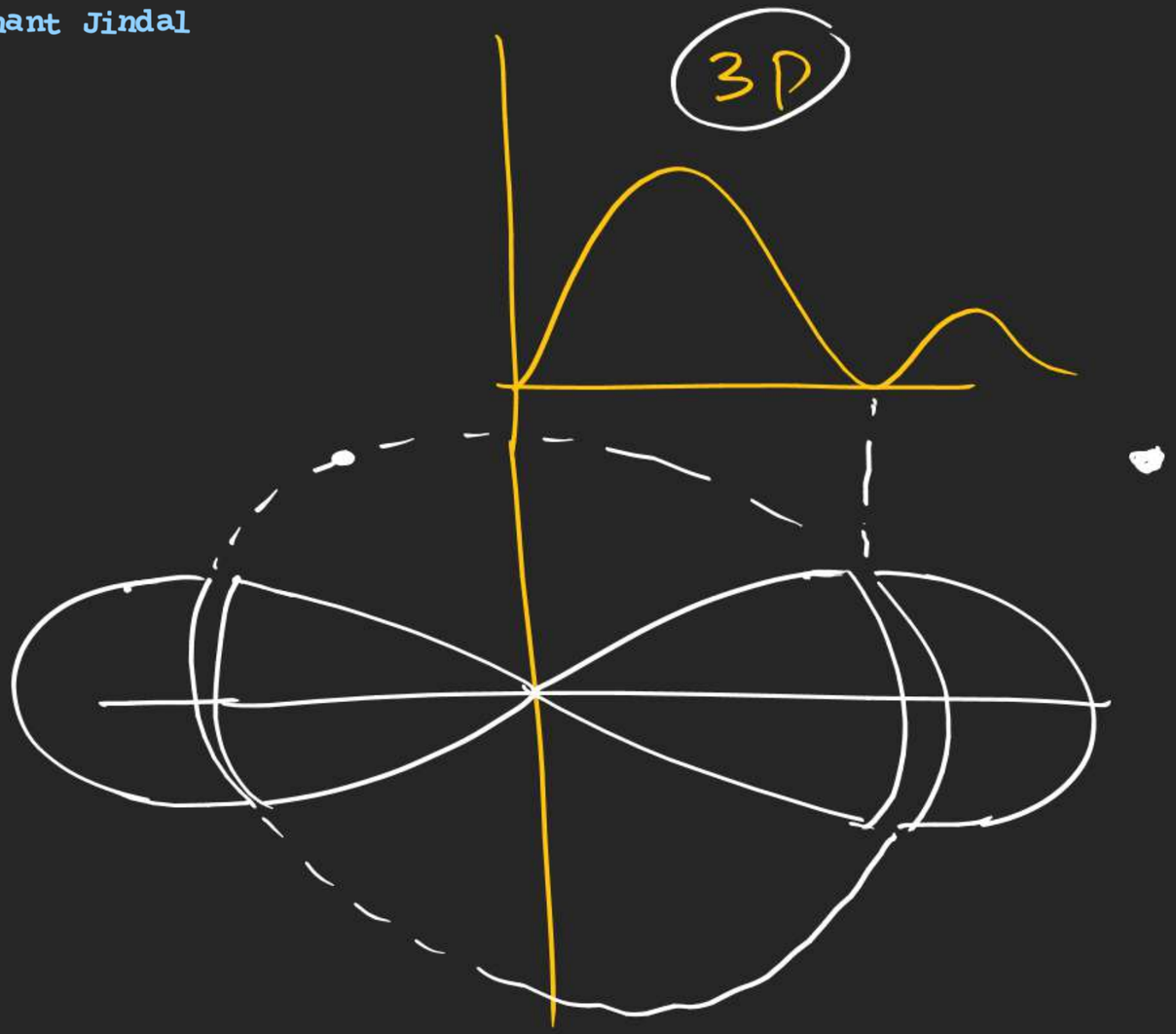

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