

Q3: According to Bohr's theory, the time-averaged magnetic field at the centre (i.e. nucleus) of a hydrogen atom due to the motion of electrons in the n^{th} orbit is proportional to (n = principal quantum number)

(a) n^{-2}

(b) n^{-3}

(c) n^{-4}

(d) n^{-5}



$$B = \frac{\mu_0 I}{2r}$$

$$I = \frac{e\omega}{2\pi}$$

$$\Rightarrow B \propto \frac{I \propto \omega}{r^2}$$

$$I = \frac{e v}{2\pi r}$$

$$v \propto \frac{I}{n} \quad r \propto n^2$$

$$I \propto \frac{v}{r}$$

$$\Rightarrow B \propto \frac{I}{n(n^2)}$$

"If you are not willing to risk the usual, you will have to settle for the ordinary."

$$\Rightarrow B \propto n^{-5}$$

January 20

Wk	M	T	W	T	F	S
01	31					1
02	3	4	5	6	7	8
03	10	11	12	13	14	15
04	17	18	19	20	21	22
05	24	25	26	27	28	29