Dr. Giridhar Kumar ☐ Mon ☐ Tue ☐ Wed ☐ Thu ☐ Fri ☐ Sat ☐ Sun

> Date

Degree-3 07 FEB 2024 . Group-C, Paper-V, P-1

Topic :- Dual nature of matter.

Since radiation has dual nature i.e it possesses properties of both, wave and particles and universe it composed of radiation and matter, therefore de-Broglie concluded that the matter must also possess dual nature, since nature loves symmetry

Topic :- De-Broglie Hypothesis

According to de-Broglie, a moving material particle sometimes acts as a wave and sometimes as a particle or a wave is associated with a moving material particle which controls the particle in every respect. The wave associated with moving material is called matter wave or de-Broglie wave, whose wavelength is given by λ.

Where $\boxed{\lambda = \frac{h}{mv}}$

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where m is the mass of the particle moving with velocity v and h is Planck's constant.

De-Broglie wavelength associated with electron accelerated under a potential difference V volt is given by:

$$\lambda = \frac{12.27\text{Å}}{\sqrt{V}}$$

The wave nature of electron i.e de-Broglie hypothesis was established experimentally by Davisson and Germer in 1937 for slow electrons and by G.P. Thomson for fast electrons.