

# Previous Year JEE Problems with Explanations

The de Broglie wavelength ( $\lambda$ ) associated with a photoelectron varies with the frequency ( $\nu$ ) of the incident radiation as, [ $\nu_0$  is threshold frequency] :

**A**  $\lambda \propto \frac{1}{(\nu - \nu_0)^{\frac{3}{2}}}$

**B**  $\lambda \propto \frac{1}{(\nu - \nu_0)^{\frac{1}{4}}}$

**C**  $\lambda \propto \frac{1}{(\nu - \nu_0)}$

**D**  $\lambda \propto \frac{1}{(\nu - \nu_0)^{\frac{1}{2}}}$

## Explanation

By photoelectric effect

$$KE = h\nu - h\nu_0 \dots(1)$$

de broglie wavelength,

$$\lambda = \frac{h}{mv} = \frac{h}{\sqrt{2m \times K.E}} \dots(2)$$

Using equation (1) and (2), we get

$$\lambda = \frac{h}{\sqrt{2m \times (h\nu - h\nu_0)}}$$

$$\therefore \lambda \propto \frac{1}{(\nu - \nu_0)^{\frac{1}{2}}}$$