

**JEE MAIN MOVING CHARGES AND MAGNETISM — MOTION IN
COMBINED ELECTRIC AND MAGNETIC FIELDS (VELOCITY SELECTOR,
CYCLOTRON) — PYQS**

Max. Marks: 4

Questions: 1

Section A (MCQ) — 1 question

Q.1 A particle of charge q and mass m is projected from origin with an initial velocity $\vec{v} = \left(\frac{v_0}{\sqrt{2}} \hat{x} + \frac{v_0}{\sqrt{2}} \hat{y} \right)$.

There exists a uniform magnetic field $\vec{B} = B_0 \hat{z}$ and a space varying electric field $\vec{E} = E_0 e^{-\lambda x} \hat{x}$ within the region $0 \leq x \leq L$. After travelling a distance such that x-coordinate has changed from $x = 0$ to $x = L$, the change in the kinetic energy is _____.

[JEE Main 2026 (Online) 5th April Evening Shift]

- (1) $\frac{qE_0}{\lambda} [1 - e^{-\lambda L}]$
- (2) $\left(\frac{v_0 q B_0}{2\lambda} \right) [2 - e^{-2\lambda L}]$
- (3) $\frac{qE_0}{\lambda} [1 + e^{-\lambda L}]$
- (4) $q \left(\frac{E_0 + v_0 B_0}{\lambda} \right) [1 - e^{-\lambda L/2}]$

Scan or tap for the full solution



ANSWER KEY

[illegible]