



Ch 8-

Electromagnetic Waves

Lect-02

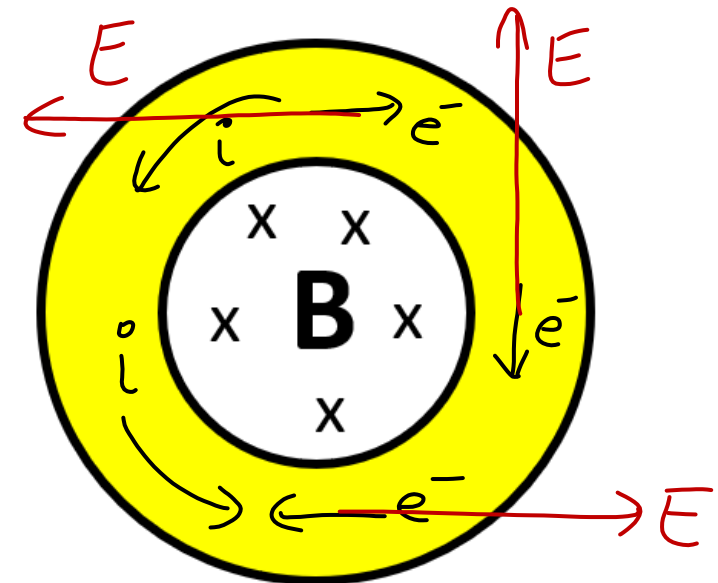
Today's Goal

**Source of
Electromagnetic Waves**

We have studied

1. A changing Magnetic Field induces an Electric Field
2. The induced Electric Field is perpendicular to Magnetic Field

Faraday



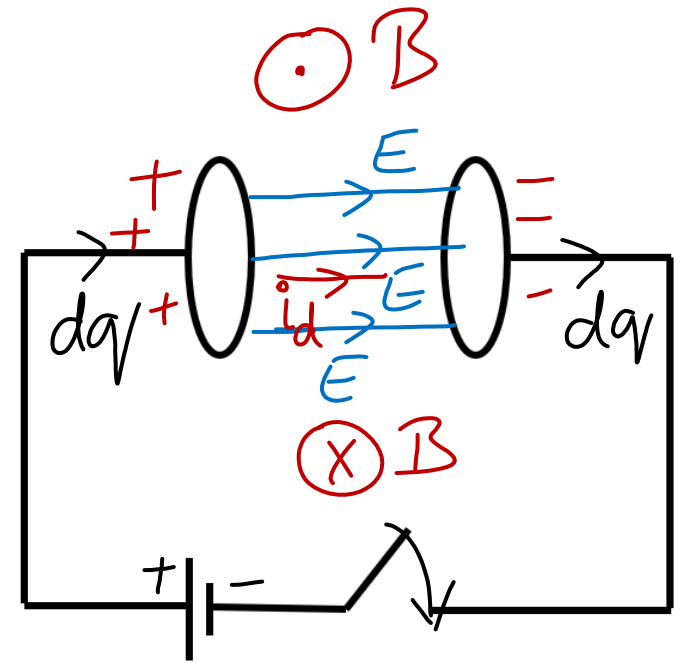
B increasing

1. A changing Electric Field induces a Magnetic Field.

2. The induced Magnetic Field is perpendicular to ~~Magnetic~~ Field

Electric

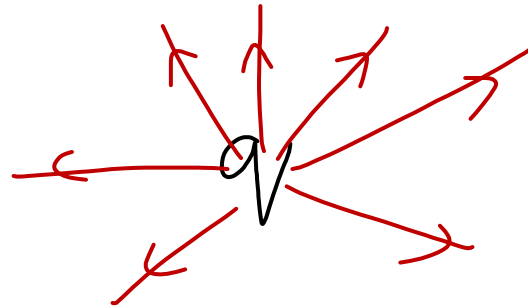
Maxwell



Electric & Magnetic Field due to a charge

Case I: Charge at Rest

Electric Field



$$\vec{i} = 0$$

$$\vec{B} = 0$$

Case II: Charge in Motion with Uniform Velocity

① Free Charge

A central point labeled 'q' has a horizontal arrow pointing to the right labeled 'i' and 'v'. Red arrows radiate outwards from 'q', representing the electric field 'E'. Below the diagram, the text reads 'Charge motion = current (i)' and 'Electric field & Magnetic field.' with checkmarks under each term.

② Charge moving in a circuit

NCERT

A rectangular circuit diagram is shown. At the bottom is a battery with '+' on the left and '-' on the right. Red arrows labeled 'e-' show current flow: upwards on the left wire, rightwards on the bottom wire, and downwards on the right wire. At the top is a resistor with red arrows labeled 'e-' showing current flow from right to left. To the right of the circuit, the text 'Magnetic field' is written with a checkmark.

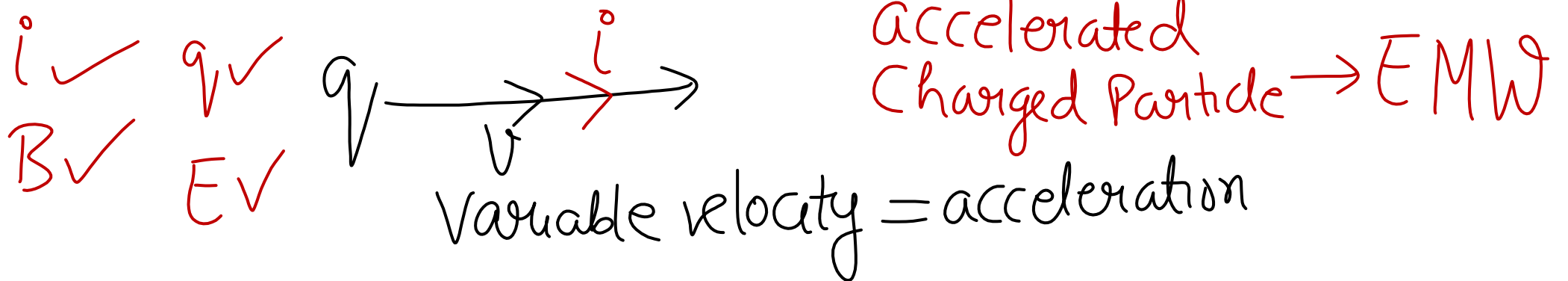
$v_{in} = 0$

$E = 0$

Case III : accelerated charged particle

an accelerated charged particle produces

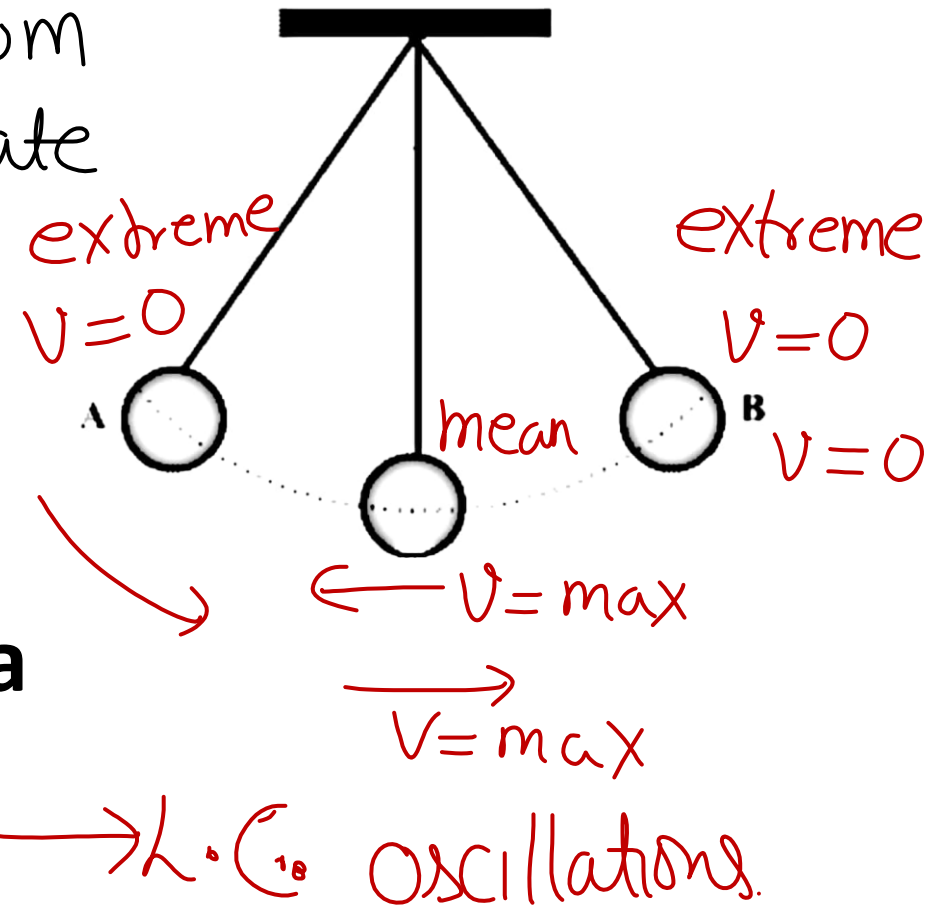
a time-varying Electric & Magnetic Field



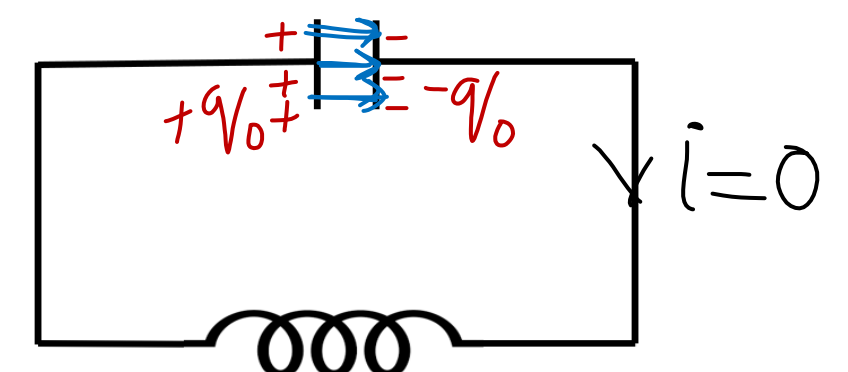
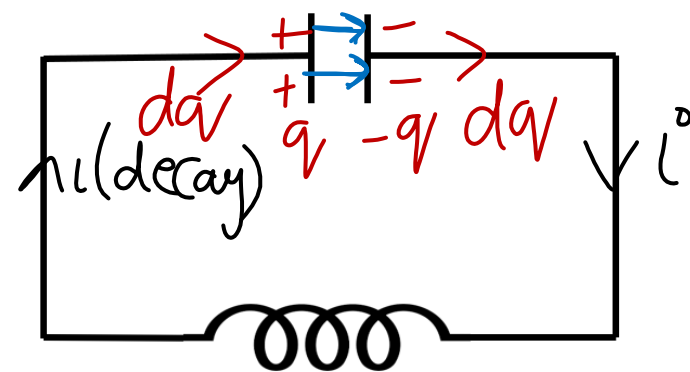
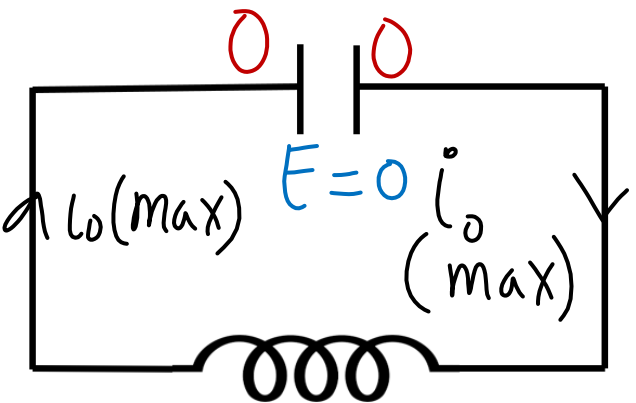
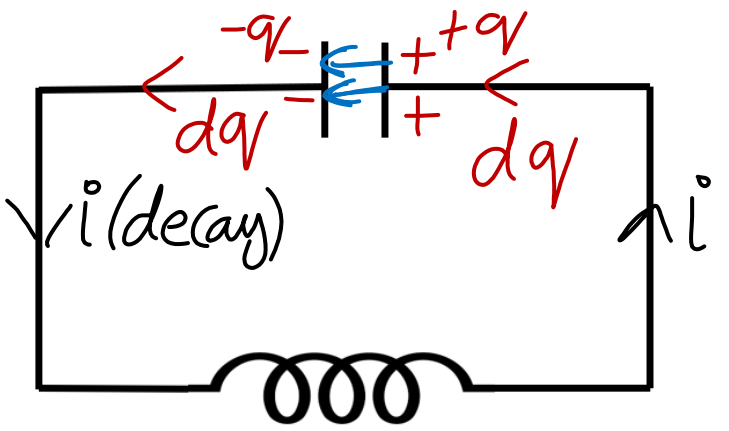
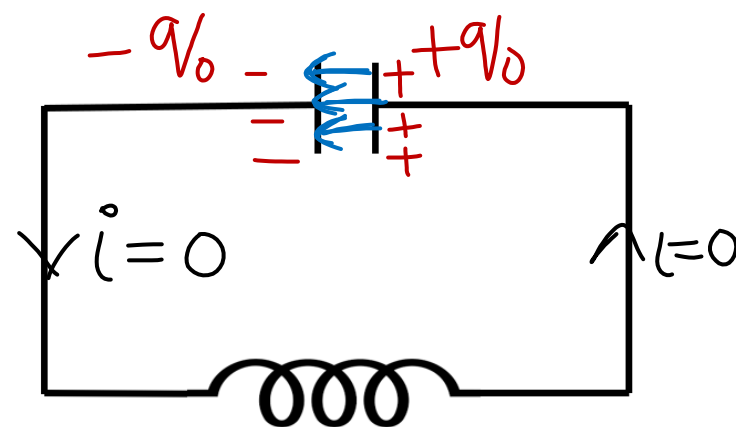
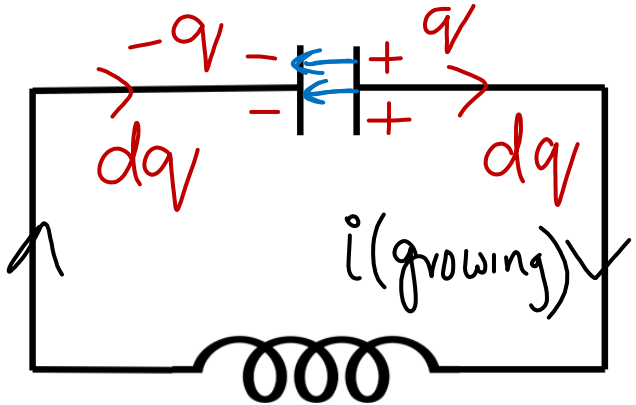
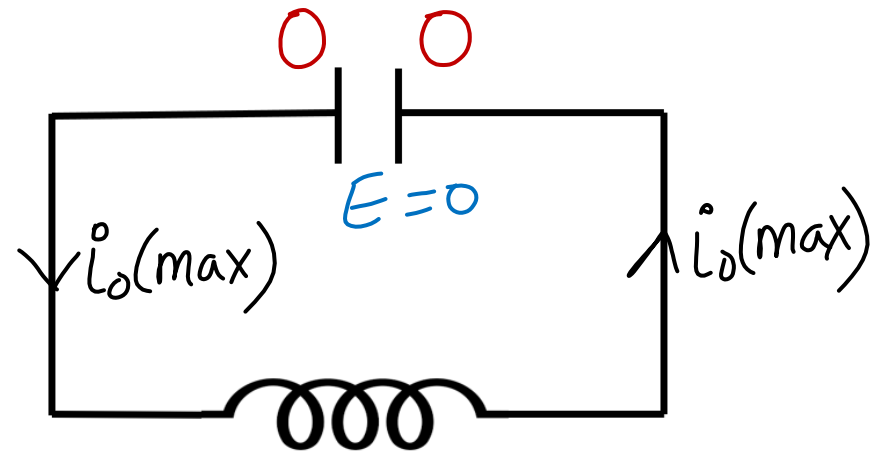
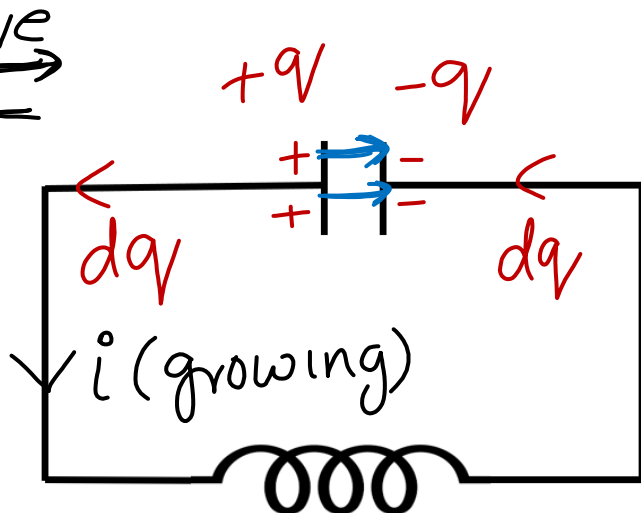
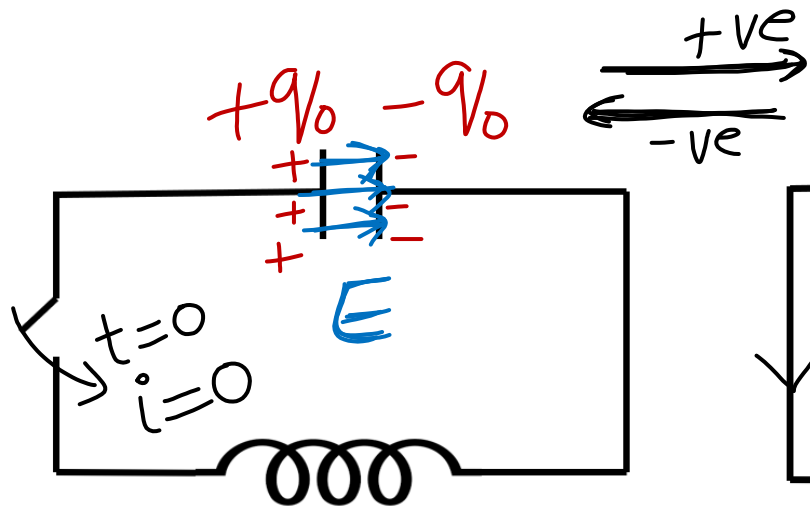
Accelerated charge - oscillating charge

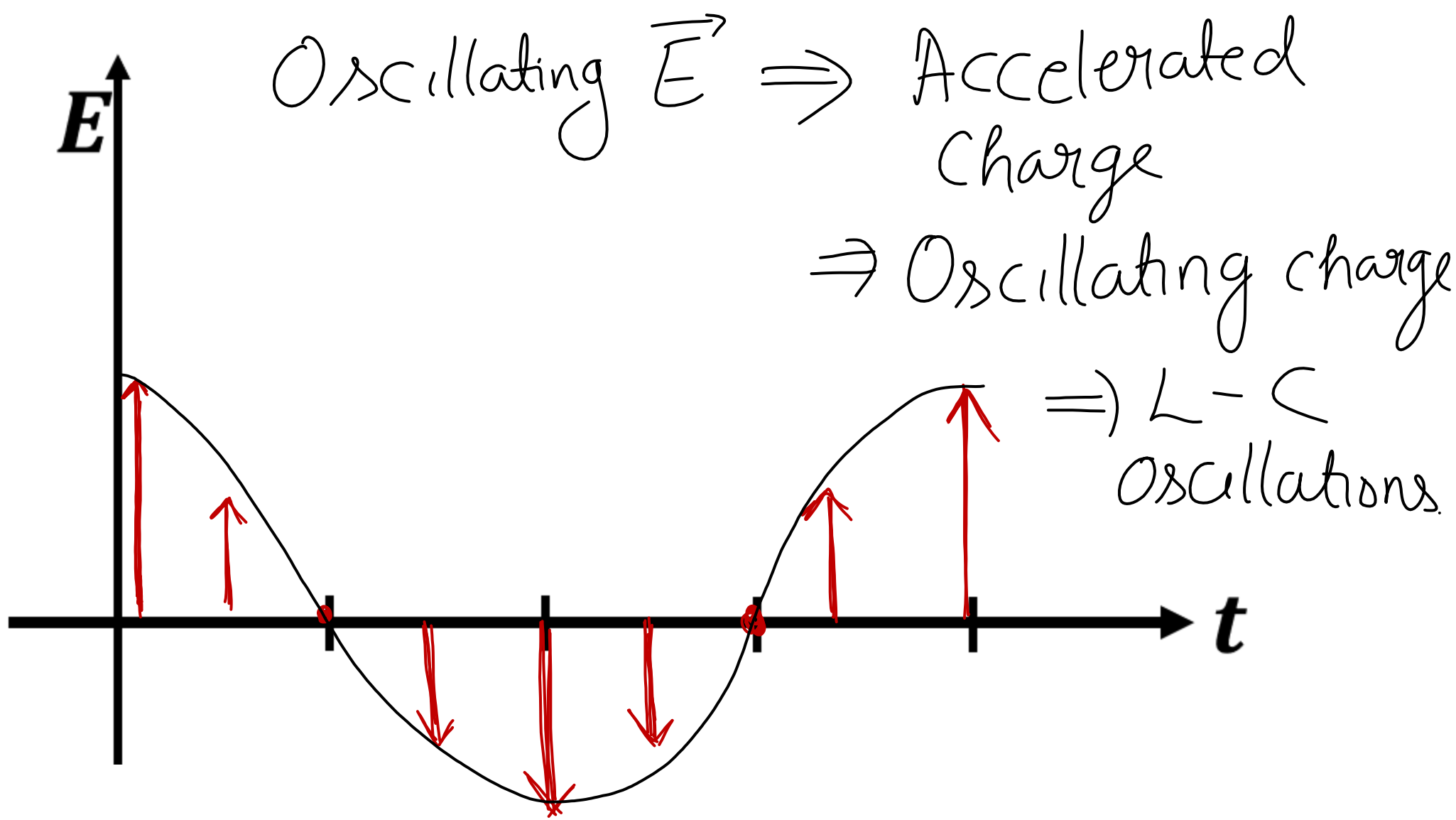
Oscillation \rightarrow acceleration
Hota hai

Pendulum
oscillate



Charge kaha
oscillate
Karta Hai?

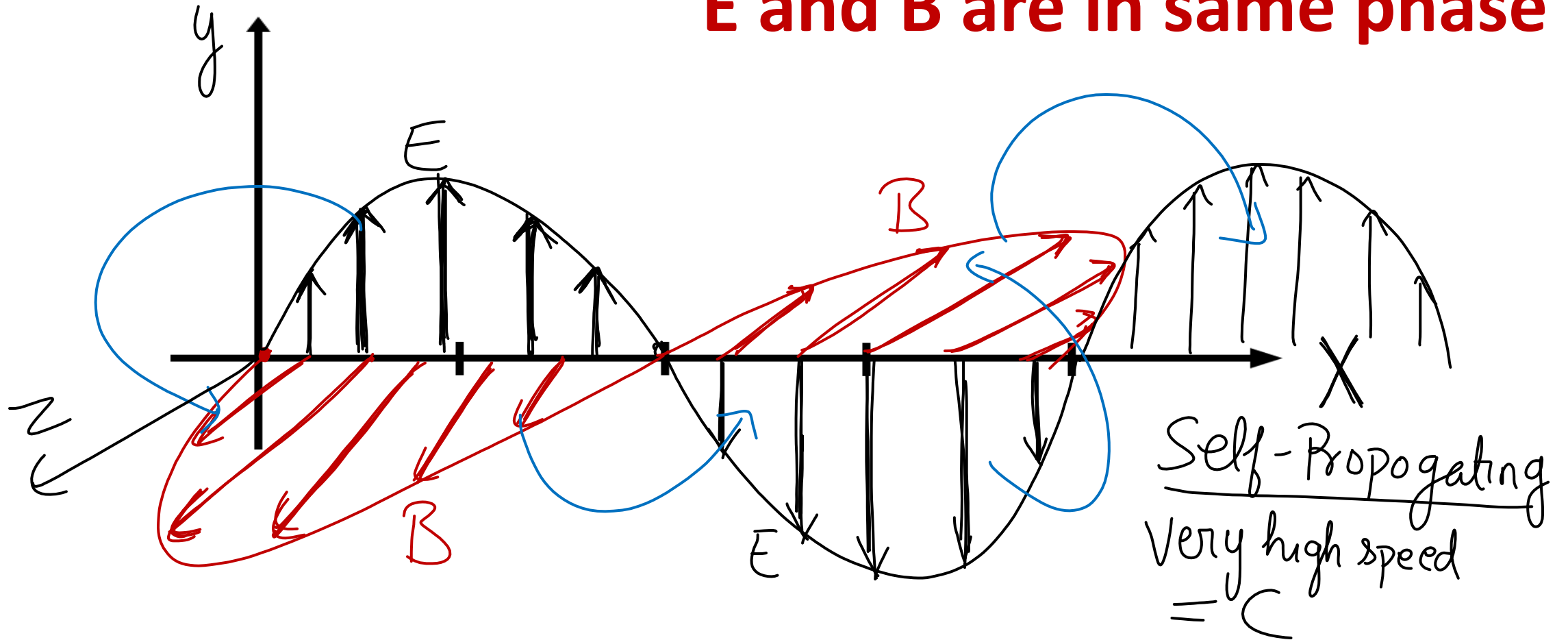




Oscillating Electric Field Produces an Oscillating Magnetic Field

Wave propagating along x

E and B are in same phase

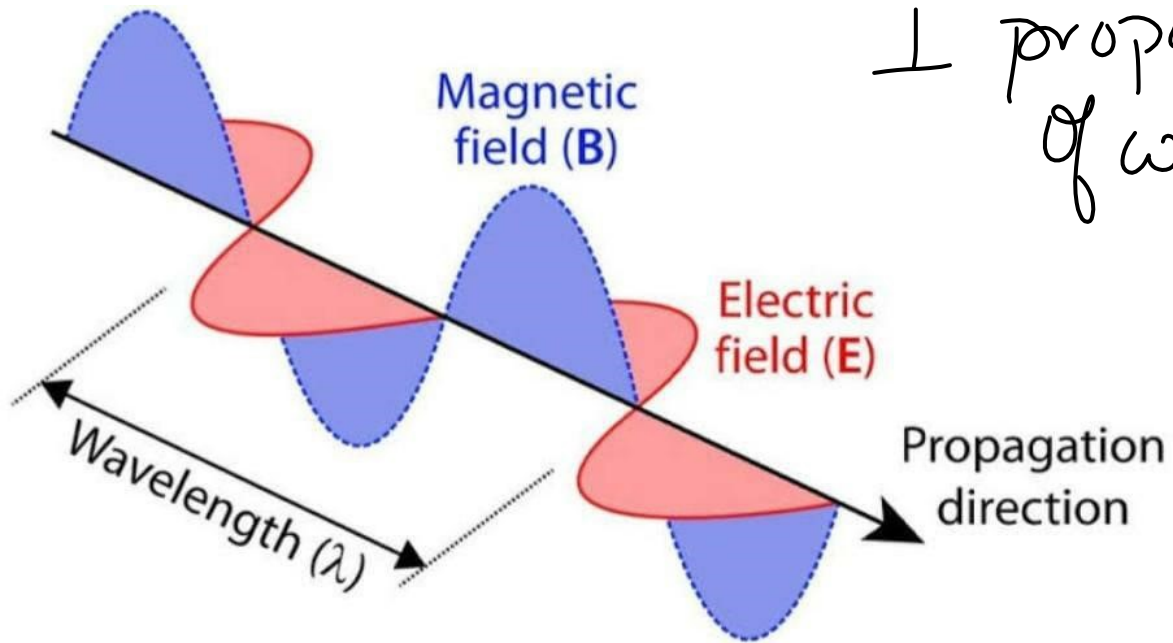


Self-Propagating
Very high speed
 $= c$

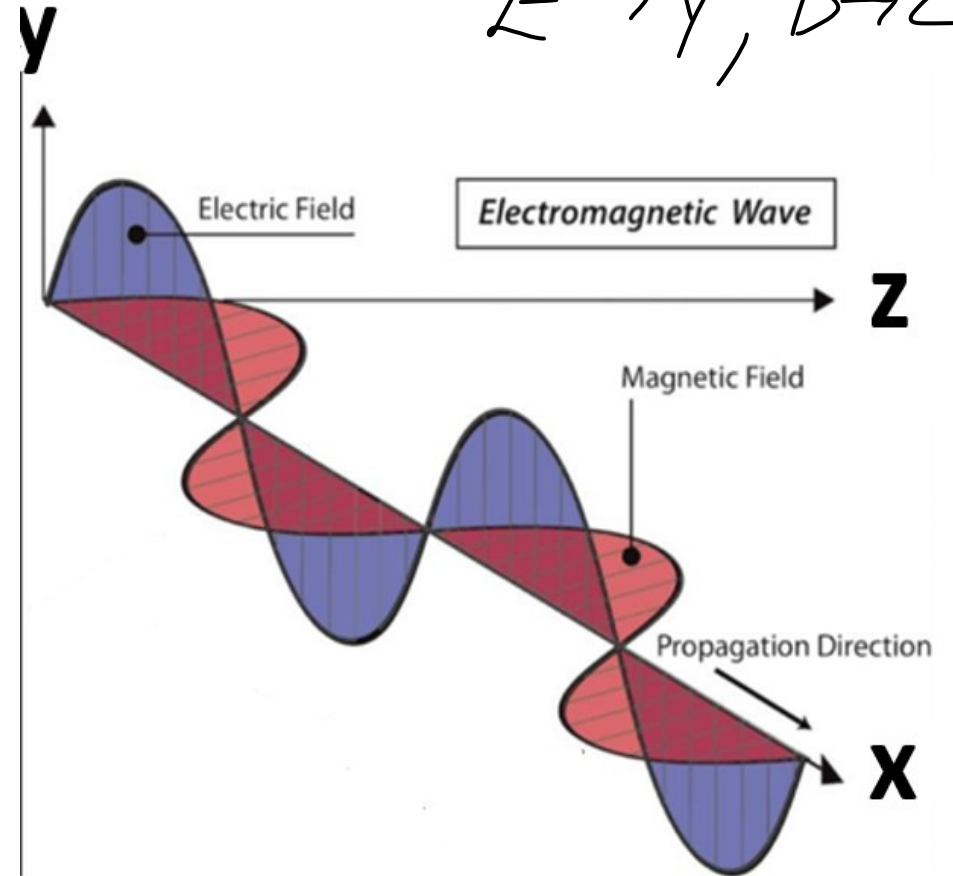
Transverse nature of Electromagnetic Wave

Oscillation of $E \perp$ oscillation of B

\perp propagation of wave



$E \rightarrow Y, B \rightarrow Z$



Thank You

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this lecture right after this
session.*