① **Velocity of propogation**-

velocity of propogation is a measure of how fast a wave travel over a time.

Derivation of velocity of propagation a velocity of travelling waves:-

For a short section dx of the line,
total inductance $= L dx$
Change in flux linkage in time dt is $iL dx$

Rate of change of flux linkage

$$= iL \frac{dx}{dt} = \text{Induced voltage}$$

But this induced voltage is equal to the voltage e

$$e = iL \frac{dx}{dt} = iLv \quad \text{—①}$$

Total capacitance of the section $=$
$= C dx$

The charge dq delivered to the section

$$dq = eC dx$$

$$i = \frac{dq}{dt} = \frac{eC dx}{dt} = eCv \quad \text{— (1)}$$

Multiplication of eq (1) & (2) gives

$$ei = ei LCv^2$$

$$v^2 = \frac{1}{LC}$$

$$\boxed{v = \pm \frac{1}{\sqrt{LC}}}$$