Expression for total number of electrons in a current carrying conductor in a magnetic field

$$N = n \times \text{volume} = nAl$$

Derivation for expression of force in a current carrying conductor in a magnetic field

- $$\vec{f} = -e(\vec{v_d} \times \vec{B})$$
- $$\vec{F} = N\vec{f}$$
- $$= nAl[-e(\vec{v_d} \times \vec{B})]$$
- $$= enA[-l\vec{v_d} \times \vec{B}]$$
- $$-l\vec{v_d} = \vec{v_d}\vec{l}$$
- $$\vec{F} = enAv_d(\vec{l} \times \vec{B})$$
- $$\vec{F} = I(\vec{l} \times \vec{B})$$

Expression of force in a current carrying conductor in a magnetic field

- $$\vec{F} = I(\vec{l} \times \vec{B})$$

Expression of force in a current carrying conductor in a magnetic field in terms of angle

$$F = IlB\sin\theta$$

Condition for minimum force in a current carrying conductor in a magnetic field

- Zero current

- Zero angle
- 180 angle

Condition for maximum force in a current carrying conductor in a magnetic field

- Perpendicular
- 90 degree