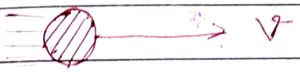
B.Sc Part - I

Einstein's Mass - Energy Equivalence

$$E = mc^2$$



Momentum $\vec{p} = m \cdot \vec{v}$

$$\because F = \frac{dp}{dt}$$

$$F = \frac{d(mv)}{dt}$$

$$F = m\frac{dv}{dt} + v\frac{dm}{dt} \quad \text{—— (i)}$$

work done by the force

$$dw = F \cdot ds$$

$$dK = F \cdot ds$$

$$dK = \left[m\frac{dv}{dt} + v\frac{dm}{dt} \right] \cdot ds$$

$$= m\frac{ds}{dt}dv + v\frac{ds}{dt} \cdot dm$$

$$= mv\,dv + v \cdot v\,dm$$

$$dK = mv\,dv + v^2 dm \quad \text{—— (2)}$$

We know that

$$m = \frac{m_0}{\sqrt{1 - v^2/c^2}}$$

Aakash Oxford