Section :- 4

(1) Establish a relation for time dilation?

Time dilation:

In the special theory of relativity, the moving clock is found to run slower than a clock at rest does. This effect is known as time dilation.

(2) Suppose S and S' are two frames of reference frame S' is moving with constant velocity v in the positive x direction w.r.t frame S.

(3) If (t_1', t_2') be the times of occurrence of two events measured by the clock in frame S' and t_0 be the corresponding time interval, then we have.

$$t_0 = t_2' - t_1'$$

4. If (t_1, t_2) be the times of occurrence of the same events measured by the another clock in the stationary frame S and t be the corresponding time interval then we have

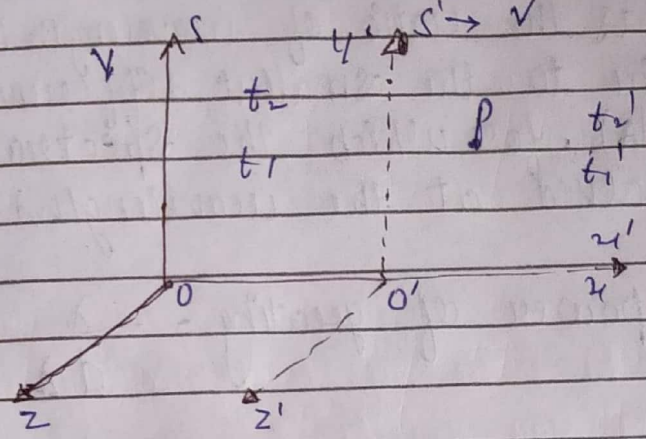
(5) using Lorentz transformation equation

$$t = \frac{t_2' + \frac{vx'}{c^2}}{\sqrt{1 - \frac{v^2}{c^2}}} - \frac{t_1' + \frac{vx'}{c^2}}{\sqrt{1 - \frac{v^2}{c^2}}}$$

$$t = \frac{t_2' + \frac{vx'}{c^2} - t_1' - \frac{vx'}{c^2}}{\sqrt{1 - \frac{v^2}{c^2}}} = \frac{t_2' - t_1'}{\sqrt{1 - \frac{v^2}{c^2}}}$$

$$t = \frac{t_0}{\sqrt{1 - \frac{V^2}{C^2}}}$$

we get $t > t_0$ So the relativistic interval of time is more than proper interval of time.



(7) Therefore a moving clock appears to go slow i.e. take more time to complete a rotation compared to a rest clock.

(8) i) if $V = C$, then $t = \infty$

(9) If V is very less than C then $t = t_0$