Q5. A certain particle called meson has a life time 2 ×10^{-6}sec; a] What is the mean life time when the particle is travelling with a speed of 2.9994× 10^8 m/sec?; b] How far does it go during one mean life?

Given:- t_0 =2 ×10^{-6}sec ; v= 2.9994× 10^8 m/sec

Formula:- $t = \frac{t_0}{\sqrt{1-\frac{v^2}{c^2}}}$; distance (d) = Speed (v) x time (t)

Solution:- $t = \frac{2\times 10^{-6}}{\sqrt{1-\left(\frac{2.9994\times 10^8}{3\times 10^8}\right)^2}}$ =31.63 x 10^{-6} sec

Distance travelled by meson during mean life time,

d = (2.994x10^8)(31.63x10^{-6})

=9470m

Ans:- The mean life time is 31.63x10^{-6}sec and the distance is 9470m.