Q 3.

A boy reaches the airport and finds that the escalator is not working. He walks up the stationary escalator in time $t_1$. If he remains stationary on a moving escalator then the escalator takes him up in time $t_2$. The time taken by him to walk up on the moving escalator will be: **[July 20, 2021 (II)]**

(a) $\frac{t_1 t_2}{t_2 - t_1}$ (b) $\frac{t_1 + t_2}{2}$

(c) $\frac{t_1 t_2}{t_2 + t_1}$ (d) $t_2 - t_1$

Ans

**(c)** Let L be the length of escalator.

Speed of man wrt escalator $= \frac{L}{t_1} = V_1$

Speed of escalator $= \frac{L}{t_2} = v_2$

Time taken when escalator is moving and man is also walking on it

$$= t = \frac{L}{v_1 + v_2} = \frac{1}{t} = \frac{v_1 + v_2}{L} = \frac{1}{t_1} + \frac{1}{t_2}$$

$$\Rightarrow t = \frac{t_1 t_2}{t_1 + t_2}$$