Step-1

Consider the differential equation:

$$\frac{du}{dT} = Au$$

Recall that following is the solution of the above differential equation, starting from $u(0)$.

$$u(T) = e^{AT}u(0)$$

Let an additional time *t* is taken to reach the following:

$$e^{At}\left(e^{AT}u(0)\right)$$

Step-2

Write down the solution at time $T+t$.

Step-3

Taken additional time solution can be written as follows:

$$e^{At}e^{AT}u(0) = e^{A(T+t)}u(0)$$

Therefore, $\boxed{e^{A(T+t)}u(0)}$ is the solution at time $T+t$. This concludes that e^{At} times e^{AT} is equal to $\boxed{e^{A(T+t)}}$.