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MECHANICAL ENGINEERING.

1. Dynamic Equation:-

This is defined as the difference in discrete time, differential equation in continuous time, state time scale calculus in combined discrete and continuous time.

$$y = At e^t - \textcircled{1} \text{ (where } A \text{ is constant)}$$

$$\frac{dy}{dt} = At \frac{d}{dt}(e^t) + e^t \frac{d}{dt}(At)$$

$$\frac{dy}{dt} = Ate^t + Ae^t \text{ --- } \textcircled{2}$$

From equation 1, make Ae^t the subject

$$y = At e^t$$
$$\frac{y}{t} = Ae^t \text{ --- } \textcircled{3}$$

Put Equation $\textcircled{1}$ and $\textcircled{3}$ into equation 2

$$\frac{dy}{dt} = y + \frac{y}{t}$$

multiply through by t

$$t \frac{dy}{dt} = ty + y$$

$$t \frac{dy}{dt} = (t+1)y$$

$$t \frac{dy}{dt} - (t+1)y = 0$$