



DEPARTMENT OF MATHEMATICS

UNIT - V LAPLACE TRANSFORM

UNIT STEP FUNCTION:

The unit step function also called Heavisides unit function is defined as

$$u(t-a) = \begin{cases} 0 & \text{for } t < a \\ 1 & \text{for } t > a \end{cases} \cdot \text{This is the unit step functions}$$

at $t=a$. It can also be denoted by $H(t-a)$ (or) $u_a(t)$.

RESULT:

Laplace Transform of unit step function is $\frac{e^{-as}}{s}$ @

$$L[u(t-a)] = \frac{e^{-as}}{s}$$

UNIT IMPULSE FUNCTION (OR) DIRAC DELTA FUNCTION:

The Dirac Delta function is denoted by

$$\delta(t-a) \text{ and is defined by } \delta(t-a) = \lim_{\epsilon \rightarrow 0} \delta_{\epsilon}(t-a)$$

$$\text{where } \delta_{\epsilon}(t-a) = \begin{cases} 1/\epsilon & ; a \leq t \leq a+\epsilon \\ 0 & ; \text{otherwise} \end{cases}$$

$$\text{(or) } \delta(t-a) = \begin{cases} \infty & ; \text{when } t=a \\ 0 & ; \text{when } t \neq a \end{cases}$$

$$\text{such that } \int_{-\infty}^{\infty} \delta(t-a) dt = 1$$