



(AnAutonomousInstitution) Coimbatore-641035.

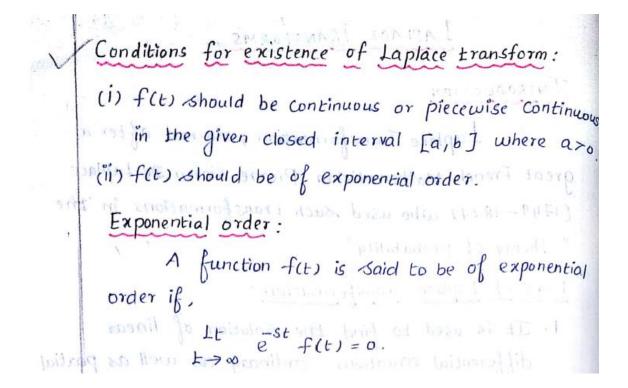
UNIT 5- Laplace Transform

Definitions, properties, existence conditions

UNIT-V LAPLACE TRANSFORMS INTRODUCTION: (1) f(t) should be continuous or ors signily Laplace Transformation, ismamed after a great French Mathematician Pierre Simon De Laplace (1749-1827) who used such transformations in the " Theory of probability" function - (CE) is Uses of Laplace Transformation: 1. It is used to find the solution of linear differential equations - ordinary as well as partial. a. It helps in solving the differential equation with boundary values without finding the general solution and then finding the values of the arbitrary constants Transformation: A transformation is an operation which converts a mathematical expression to a different but equivalent form. Laplace Transformation: Definition: Let f(t) be a function of t defined for tro Then the Laplace transform of f(t), denoted by 1 {f(t)} or F(s) is defined by, L[f(E)] = Set f(E) dE) = F(S) Provided the integral exists. o= = 0 ==









(AnAutonomousInstitution) Coimbatore-641035.

Transforms of elementary functions

$$L(1) = \int_{0}^{\infty} e^{-St} \cdot 1 dt$$

$$= -\frac{1}{S} (0-1) = \frac{1}{S}$$

$$1 + n = \frac{1}{S}$$

$$1 + n = \frac{1}{S}$$

$$2 L(K) = \frac{K}{S}$$

$$(3) L(t) = \frac{1!}{5^2}$$

$$L(t) = \int_{-\infty}^{\infty} e^{-St} \cdot t \, dt$$

$$L(t) = \frac{1!}{s^2}$$

$$L(t) = \int e^{-St} \cdot t \, dt$$

$$= \left[\frac{\pm e^{-St}}{-s} - \frac{-St}{s^2} \right]_0^{\infty} \quad u = t \quad v = \frac{-St}{-s}$$

$$L(t) = \frac{1!}{s^2}$$

$$L(t) = \frac{1!}{s^2}$$

$$L(t) = \frac{1!}{s^2}$$

$$V_1 = \frac{e^{-St}}{-s}$$

$$V_2 = \frac{e^{-St}}{s^2}$$

$$I = u v_1 - u' v_2 + u''' v_3$$

$$u=t$$
 $V=e^{-st}$

$$u' = 1$$

$$u'' = 0$$

$$V_1 = \frac{e^{-st}}{-s}$$

$$\sqrt{\frac{10}{2}}$$
 $\sqrt{2} = \frac{e^{-St}}{2}$

$$1) L(t^2) = 2!$$





$$L(e^{at}) = \frac{1}{s-a} \quad \text{if } s-a > 0.$$

$$L(e^{at}) = \int_{0}^{\infty} e^{-st} e^{at} dt$$

$$= \int_{0}^{\infty} e^{-(s-a)t} dt$$

$$= \left[\frac{e^{-(s-a)t}}{-(s-a)}\right]_{0}^{\infty}$$

$$L(e^{at}) = \frac{1}{s-a} \quad \text{if } s-a > 0$$

$$L(e^{at}) = \frac{1}{s-a} \quad \text{if } s+a > 0$$

$$L(e^{-at}) = \int_{0}^{\infty} e^{-st} e^{-at} dt$$

$$L(e^{-at}) = \int_{0}^{\infty} e^{-st} e^{-at} dt$$





