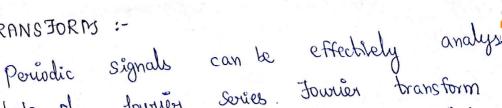
TRANSFORM :-JOURIER



with the help of fourier Series. Fourier transform can be applied for both periodic and non-periodic

Signals. Journey transform is given as $x(w) = \int x(t) e^{-jwt} dt$

(071)

$$x(F) = \int_{-\infty}^{\infty} x(t) e^{-j2\pi ft} dt$$

$$F[x(t)] = X(\omega) (07) x(F)$$

Transform :-FOUTION Inverse

$$x(t) = \frac{1}{2\pi} \int_{-\infty}^{\infty} x(t) e^{t \int_{0}^{t} 2\pi t f t} dt$$

$$x(t) = \frac{1}{2\pi} \int_{-\infty}^{\infty} x(t) e^{t \int_{0}^{t} t t} dt$$

$$x(t) = \frac{1}{2\pi} \int_{-\infty}^{\infty} x(t) e^{t \int_{0}^{t} t t t} dt$$

$$x(t) = \frac{1}{2\pi} \int_{-\infty}^{\infty} x(t) e^{t \int_{0}^{t} t t t} dt$$

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$$x(t) = \frac{1}{2\pi} \int_{-\infty}^{\infty} x(t) e^{t \int_{0}^{t} t t t} dt$$

$$x(t) = \frac{1}{2\pi} \int_{0}^{t} e^{t \int_{0}^{t} t t t} e^{t \int_{0}^{t} t} e^{t \int_{0}^{t} t t} e^{t \int_{0}^$$

Jourien transform :-* The Function 2(1) should be singled value in Existence time interval. T. any finite

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*
$$x(t)$$
 should have the most shifte no of discontinuits
in any time interval T.
* $x(t)$ should have the shifte no of maxima and menima
in any finite time interval T.
* The function $x(t)$ should be absolutely integrable.
Proporties of Jourier TRANSFORM:
) histority :- $x_i(t) \stackrel{r}{\leftarrow} x_i(t) + x_2(t) \stackrel{r}{\leftarrow} x_2(t) \stackrel{r}{\leftarrow} x_2(t)$
 $x(t) = \int_{0}^{t} x(t) + c_2 x_2(t) \stackrel{r}{\leftarrow} x_1(t) + c_2 x_2(t)$
 $x(t) = \int_{0}^{t} x(t) + c_2 x_2(t) e^{-j2\pi t} dt$
 $= c_1 \int_{0}^{t} x_1(t) + c_2 x_2(t)$

2) Time Shifting :

$$x(t) \leftrightarrow x(F)$$
 then $x(t+t_0) \leftrightarrow x(F) e^{-j2\pi F t_0}$
 $x(t) \leftrightarrow x(F) = \int_{-\infty}^{\infty} x(t) e^{-j2\pi f t} dt$
 $= \int_{-\infty}^{\infty} x(t+t_0) e^{-j2\pi f t} dt$
 $t-t_0 = m$, $t=m+t_0$, $dt = dm$
 $t-t_0 = m$, $t=m+t_0$, $dt = dm$
 $= \int_{-\infty}^{\infty} x(m) e^{-j2\pi f (m+t_0)} dm$
 $= \int_{-\infty}^{\infty} x(m) e^{-j2\pi f m} e^{-j2\pi f t_0} dm$
 $= \int_{-\infty}^{\infty} x(m) e^{-j2\pi f m} dm e^{-j2\pi f t_0}$
 $= \int_{-\infty}^{\infty} x(m) e^{-j2\pi f m} dm e^{-j2\pi f t_0}$
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3) Inquery of the property:
24
$$x(t) \Leftrightarrow x(t)$$
 then $e^{j2\pi i f_{c}t} x(t) \Leftrightarrow x(t-f_{c})$ where $x(t) = \int_{0}^{t} x(t) e^{j2\pi i f_{c}t} dt$
 $= x(t-f_{c})$
4) Area Under $x(t) =$
 $\pi i x(t) \Leftrightarrow x(t)$ then area under $x(t) = \int_{0}^{t} x(t) dt = x(t)$
 $x(t) = \int_{0}^{t} x(t) dt$
 $x(t) = \int_{0}^{t} x(t) dt$
5) Area Under $x(t) =$
 $\pi i x(t) \Leftrightarrow x(t)$ then area under $x(t) = \int_{0}^{t} x(t) dt = x(t)$
 $x(t) = \int_{0}^{t} x(t) dt$
5) Area Under $x(t) =$
 $\pi i x(t) \Leftrightarrow x(t)$ then area under $x(t) = \int_{0}^{t} x(t) dt = x(t)$
 $x(t) = \int_{0}^{t} x(t) dt$
 $x(t) = \int_{0}^{t} x(t) dt$
 $t = 0$
 $x(t) = \int_{0}^{t} x(t) dt$
(b) $x(t)$ then $x(at) = \frac{1}{|a|} x(\frac{t}{a})$
 $a i the scaling factor
 $x(t) = \int_{0}^{t} x(t) e^{j2\pi i t} dt$
 $x(t) = \int_{0}^{t} x(t) e^{j2\pi i t} dt$$

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270 at=m, t=m/a, dt=dm/a $x(F) = \int_{0}^{\infty} x(at) e^{j2\pi ft} dt$ $= \int_{0}^{\infty} x(m) e^{-j2\pi f(m/a)} dm/a$ $= \int_{0}^{\infty} x(m) e^{j2\pi f(m/a)} dm/a$ $= \int_{0}^{\infty} \int_{0}^{\infty} x(m) e^{j2\pi f(m/a)} dm$ dm $= \frac{1}{a} \times (F_{a}) \longrightarrow (f_{a})$

(ii)
$$a \ge 0$$
 $x(F) = \frac{1}{-a} x(F/a) \longrightarrow (2)$
combining (i) $e(2)$

$$x(F) = \frac{1}{[a]} \times (7a)$$

Duality on symmetry Property:-

$$x(t) \iff x(F) \quad \text{then } \mathbf{x}(t) \iff x(-F)$$

bransform

Inverse

7)

Fourier branstorm

$$x(t) = \int_{\infty}^{\infty} x(F) e^{j2\pi ft} dF$$

Replace
$$t = -t$$

 $x(-F) = \int_{-\infty}^{\infty} x(F) e^{j2\pi f(-t)} dF$
 $x(-F) = \int_{-\infty}^{\infty} (x(t)) e^{j2\pi f t} dF$

$$x(t) = x(-F)$$

$$D_{i}fferentiation in time Domain :=$$

$$If x(t) \iff x(F) \quad then \quad d'_{i}t \quad x(t) \iff j_{2}\pi f \quad x(F)$$

$$x(t) = \int_{0}^{\infty} x(F) \quad e^{j_{2}\pi Ft} dF$$

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t=F

$$\frac{d}{dt} = x(t) = \int_{-\infty}^{\infty} A(t) \quad jant = e^{jant + t} dt$$

$$\frac{d}{dt} = x(t) = x(t) \quad jant = e^{jant + t} dt$$
a) Integration in time domain :

$$\pi(t) \iff x(t) \quad then \quad \int_{0}^{\infty} x(t) dt \quad \Leftrightarrow \quad \frac{1}{jant} \times (t)$$

$$tet \qquad x(t) = \frac{d}{dt} \left[\int_{-\infty}^{\infty} x(t) dt \right]$$

$$F \left[\frac{d}{dt} x(t) \right] = F \left[\frac{d}{dt} \left[\int_{0}^{t} x(t) dt \right] \right]$$

$$F \left[\frac{d}{dt} x(t) \right] = jant \quad F \left[x(t) \right]$$

$$F \left[\frac{d}{dt} x(t) \right] = jant \quad F \left[\frac{d}{dt} \right]$$

$$\frac{1}{jant} \times (t) = F \left[\int_{0}^{t} x(t) dt \right]$$

$$\frac{1}{jant} \left[x(t) - F \left[\int_{0}^{t} x(t) dt \right] \right]$$

$$\frac{1}{yant} \left[x(t) - F \left[\int_{0}^{t} x(t) dt \right] \right]$$

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$$\frac{1}{yant} \left[x(t) - F \left[\int_{0}^{t} x(t) dt \right] \right]$$

$$\frac{1}{yant} \left[x(t$$

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11)

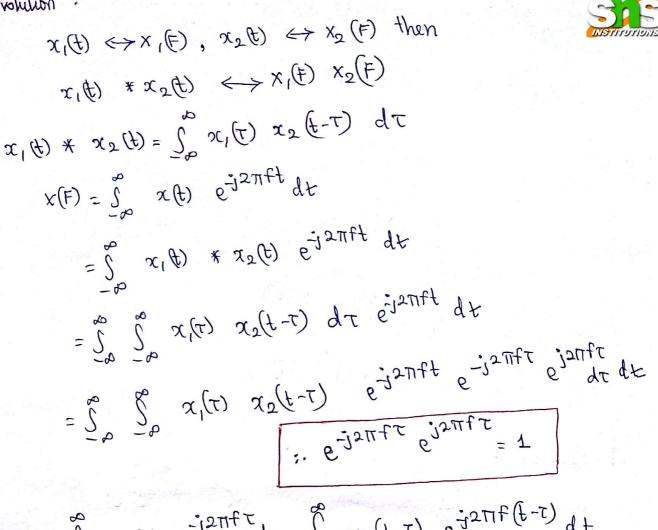
fx* e^{j 2nf} dF ŝ, (x *(-F) (t)4



$$\begin{aligned} x^*(t) &\longleftrightarrow x^*(F) \\ \text{Multiplication Theorem:} \\ x_{(t)} &\Leftrightarrow x_{(E)}, x_{2}(t) &\longleftrightarrow x_{2}(F) \\ \text{Multiplication Theorem:} \\ x_{(t)} &x_{2}(t) &\Leftrightarrow x_{1}(E) &* x_{2}(F) \\ \text{Multiplication:} \\ x_{1}(t) &x_{2}(t) &\longleftrightarrow x_{1}(E) &* x_{2}(F) \\ \text{Multiplication:} \\ x_{1}(F) &* x_{2}(F) &= \int_{0}^{\infty} x_{1}(t) &x_{2}(F) &d\lambda \\ x_{1}(F) &= \int_{0}^{\infty} x(t) &e^{i2\pi F t} dt \\ &= \int_{0}^{\infty} x_{1}(t) &\cdot x_{2}(t) &e^{i2\pi F t} dt \\ x_{2}(t) &= \int_{0}^{\infty} x_{2}(F) &e^{i2\pi F t} dF' \\ &= \int_{0}^{\infty} x_{1}(t) &\int_{0}^{\infty} x_{2}(F) &e^{i2\pi F t} dF' \\ &= \int_{0}^{\infty} x_{1}(t) &\int_{0}^{\infty} x_{2}(F) &e^{i2\pi F t} dF' &e^{i2\pi F t} dt \\ &= \int_{0}^{\infty} x_{1}(t) &\int_{0}^{\infty} x_{2}(F) &e^{i2\pi F t} dF' &dF' &dF' &dF' \\ &= \int_{0}^{\infty} x_{1}(t) &\int_{0}^{\infty} x_{2}(F) &e^{i2\pi F t} dA \\ &= \int_{0}^{\infty} x_{1}(t) &\int_{0}^{\infty} x_{2}(F) &e^{i2\pi F t} dA \\ &= \int_{0}^{\infty} x_{2}(t) &\int_{0}^{\infty} x_{2}(F-\lambda) &e^{i2\pi F \lambda} d\lambda dt \\ &= \int_{0}^{\infty} x_{2}(E-\lambda) &d\lambda &\int_{0}^{\infty} x_{1}(t) &e^{i2\pi F \lambda} d\lambda \\ &= \int_{0}^{\infty} x_{2}(E-\lambda) &d\lambda &\int_{0}^{\infty} x_{1}(t) &e^{i2\pi F \lambda} d\lambda \\ &= \int_{0}^{\infty} x_{1}(t) &x_{2}(F-\lambda) &d\lambda \\ &= \int_{0}^{\infty} x_{1}(t) &x_{2}(F-\lambda) &d\lambda \\ &= \int_{0}^{\infty} x_{1}(F) &* &x_{2}(F) \end{aligned}$$

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convolution :-



$$= \int_{\mathcal{P}}^{\infty} x_{1}(\tau) e^{-j2\pi f \tau} d\tau \int_{\mathcal{P}}^{\infty} x_{2}(t-\tau) e^{j2\pi f (t-\tau)} dt$$

$$+ -\tau = m , dt = dm$$

$$X_1(E) \int_{-e}^{\infty} x_2(m) e^{-j2\pi fm} dm$$

$$x(F) = x_1(F) + x_2(F)$$

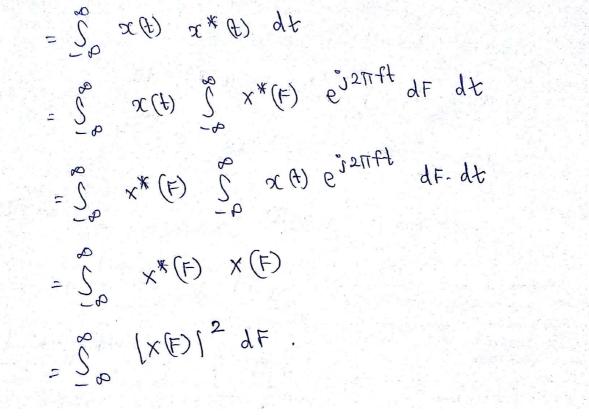
$$x(F) = x_{1}(F) + 2e^{-x_{2}}$$

$$F = \int_{-\infty}^{\infty} |x(F)|^{2} dF$$

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 $E = \int_{\infty}^{\infty} \left[x(t) \right]^2 dt$



