

SNS College of Technology

(An Autonomous Institution)

Coimbatore – 35



DEPARTMENT OF MATHEMATICS **UNIT- II FOURIER TRANSFORM** CONVOLUTION OF TWO FUNCTION

Passeral's Identity:

J. Using transform methods, evaluate
$$\int_{0}^{\infty} \frac{dx}{(x^{2}+c^{2})^{2}}$$

Solz:

consider $\int_{0}^{\infty} (x) = e^{-ax}$
 $\int_{0}^{\infty} [f(x)] = \int_{0}^{\infty} [f(x)] = \int_{0}^{\infty} \frac{dx}{(x^{2}+c^{2})^{2}} dx$

Now, $\int_{0}^{\infty} [f(x)]^{2} dx = \int_{0}^{\infty} [f(x)]^{2} dx$
 $\int_{0}^{\infty} e^{-2ax} dx = \int_{0}^{\infty} \frac{a^{2}}{(x^{2}+c^{2})^{2}} dx$

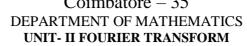
 $\left[\frac{e^{2\alpha \pi}}{e^{2\alpha}}\right]^{\infty} = \frac{2a^{2}}{\pi}\int_{0}^{\infty} \frac{ds}{(s^{2}+a^{2})^{2}}$

X

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CONVOLUTION OF TWO FUNCTION



$$\frac{1}{2a} \begin{bmatrix} 0 - i \end{bmatrix} = \frac{2a^2}{\pi} \int_0^{\infty} \frac{ds}{(s^2 + a^2)^2}$$

$$\frac{T}{2a(2a^2)} = \int_0^{\infty} \frac{ds}{(s^2 + a^2)^2}$$

$$\Rightarrow \int_0^{\infty} \frac{dx}{(x^2 + a^2)^2} = \frac{\pi}{4a^3}$$

2]. Using teanesform methods, evaluate
$$\int_{0}^{\infty} \frac{x^{2} dx}{(x^{2} + \alpha^{2})^{2}}$$
 where are.

Solo.:

$$consider \quad b(n) = e^{-ax}$$

$$F_{S}[g(n)] = F_{S}[e^{-ax}] = \sqrt{\pi} \frac{g}{g^{2} + a^{2}}$$

Now,
$$\int_{0}^{\infty} |f(x)|^{2} dx = \int_{0}^{\infty} f(x)|^{2} dx$$

$$\int_{0}^{\infty} e^{-2ax} dx = \int_{0}^{\infty} \frac{e^{2a}}{\pi} \frac{e^{2a}}{(e^{2a} + a^{2a})^{2}} dx$$

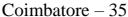
$$\int_{0}^{\infty} e^{-2ax} dx = \int_{0}^{\infty} \frac{e^{2a}}{\pi} \frac{e^{2a}}{(e^{2a} + a^{2a})^{2}} dx$$

$$\int_{0}^{\infty} \frac{e^{2a}}{e^{2a}} dx = \int_{0}^{\infty} \frac{e^{2a}}{(e^{2a} + a^{2a})^{2}} dx$$

$$\int_{0}^{\infty} \frac{e^{2a}}{(e^{2a} + a^{2a})^{2}} dx = \int_{0}^{\infty} \frac{e^{2a}}{(e^{2a} + a^{2a})^{2}} dx = \int_{0}^{\infty}$$

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CONVOLUTION OF TWO FUNCTION

Frod the F.T. of
$$e^{-\alpha/2\zeta}$$
, where f is $\frac{d\alpha}{d\alpha+1} = \frac{\pi}{4}$

Soln:

(Problem &

By Pauseval's Identity,
$$\int_{-\infty}^{\infty} |F(c)|^2 dc = \int_{-\infty}^{\infty} |g(x)|^2 dx$$

$$\int_{-\infty}^{\infty} \frac{\partial}{\partial x} \frac{1}{(1+c^2)^2} dc = \int_{-\infty}^{\infty} (e^{-1\times 1})^2 dx$$

$$\frac{4}{\pi} \int_{0}^{\infty} \frac{ds}{e^{2} + D^{2}} = 2 \int_{0}^{\infty} e^{-2x} dx$$

$$= 2 \left(\frac{e^{-2x}}{-2} \right)_{0}^{\infty}$$

$$= -1 \left(0 - 1 \right)$$

$$\Rightarrow \int_{0}^{\infty} \frac{dx}{(x^{2}+1)^{2}} = \frac{\pi}{4}$$