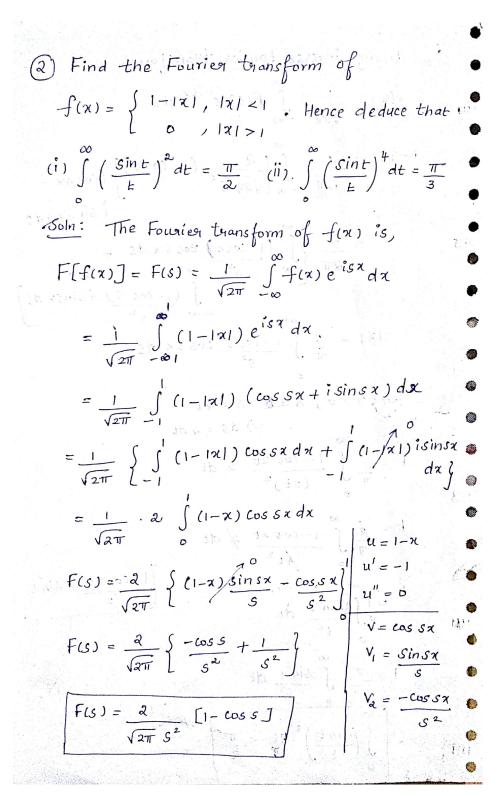




SNS COLLEGE OF TECHNOLOGY

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DEPARTMENT OF MATHEMATICS





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(i) Using inverse fourier blans form,
$$f(x) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\infty} F(s) e^{-isx} ds$$

$$|-1\pi| = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\infty} \left(\frac{2}{\sqrt{2\pi}} s^{2}\right) \left(\cos sx - \frac{1}{\sqrt{2\pi}} s^{2}\right) \left(\sin sx \right) ds$$

$$= \frac{2}{\sqrt{2\pi}} \int_{-\infty}^{\infty} \frac{1 - \cos s}{s^{2}} \cos sx ds$$

$$|-1\pi| = \frac{2}{\pi} \int_{-\infty}^{\infty} \frac{1 - \cos s}{s^{2}} \cos sx ds$$

$$|-1\pi| = \frac{2}{\pi} \int_{-\infty}^{\infty} \frac{1 - \cos s}{(2t)^{2}} dt$$

$$= \frac{2}{\pi} \int_{-\infty}^{\infty} \frac{1 - \cos s}{(2t)^{2}} dt$$

$$= \frac{1}{\pi} \int_{-\infty}^{\infty} \frac{1 - \cos s}{t^{2}} dt$$

$$= \frac{1}{\pi} \int_{-\infty}^{\infty} \frac{\sin^{2}t}{t^{2}} dt$$

$$= \frac{2}{\pi} \int_{-\infty}^{\infty} \frac{\sin^{2}t}{t^{2}} dt$$



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(ii) Using Passeval's identity,
$$\int_{-\infty}^{\infty} [F(s)]^2 ds = \int_{-\infty}^{\infty} [f(x)]^2 dz$$

$$\int_{-\infty}^{\infty} \left[\frac{2}{\sqrt{2\pi}} s^2 \left(1 - \cos s\right)\right]^2 ds = \int_{-\infty}^{\infty} (1 - |x|)^2 dz$$

$$\frac{4}{\sqrt{2\pi}} \int_{-\infty}^{\infty} \left(\frac{1 - \cos s}{s^2}\right)^2 ds = 2 \int_{-\infty}^{\infty} (1 - x)^2 dz$$

$$\frac{2}{\sqrt{2\pi}} \cdot 2 \int_{-\infty}^{\infty} \left(\frac{1 - \cos s}{s^2}\right)^2 ds = 2 \int_{-\infty}^{\infty} (1 + x^2 - 2x) dz$$

$$\frac{4}{\sqrt{2\pi}} \int_{-\infty}^{\infty} \left(\frac{1 - \cos s}{s^2}\right)^2 ds = 2 \int_{-\infty}^{\infty} (1 + x^2 - 2x) dz$$

$$= 2 \left[1 + \frac{1}{3} - 1\right] = \frac{2}{3}$$

$$\int_{-\infty}^{\infty} \left(\frac{1 - \cos s}{s^2}\right)^2 ds = \frac{2}{3} \times \frac{\pi}{\sqrt{2\pi}} = \frac{\pi}{\sqrt{2\pi}}$$

$$\int_{-\infty}^{\infty} \left(\frac{1 - \cos s}{\sqrt{2\pi}}\right)^2 ds = 2 dt$$

$$\int_{-\infty}^{\infty} \left(\frac{1 - \cos s}{\sqrt{2\pi}}\right)^2 ds = 2 dt$$

$$\int_{-\infty}^{\infty} \left(\frac{1 - \cos s}{\sqrt{2\pi}}\right)^2 ds = 2 dt$$

$$\int_{-\infty}^{\infty} \left(\frac{1 - \cos s}{\sqrt{2\pi}}\right)^2 ds = \frac{\pi}{\sqrt{2\pi}}$$

$$\int_{-\infty}^{\infty} \left(\frac{\sin t}{\sqrt{2\pi}}\right)^4 x \frac{x}{\sqrt{2\pi}} x dt = \frac{\pi}{\sqrt{2\pi}}$$

$$\int_{-\infty}^{\infty} \left(\frac{\sin t}{\sqrt{2\pi}}\right)^4 x \frac{x}{\sqrt{2\pi}} x dt = \frac{\pi}{\sqrt{2\pi}}$$

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