

SNS COLLEGE OF TECHNOLOGY



(An Autonomous Institution) Coimbatore – 35

DEPARTMENT OF MATHEMATICS UNIT-IV FOURIER TRANSFORM

Using parsevals Identity calculate
$$\int \frac{\pi^2}{h^2 + n^2} dn$$
, is as
solved.
NHT Fs(s)=fs[3(m)] = $\sqrt{\frac{2}{\pi}} \int_{0}^{\infty} e^{-an} m sndn = \sqrt{\frac{2}{\pi}} \int_{a^2 + s^2}^{\frac{\pi}{2}} ds$
parsevali Fdintily.
 $\int_{0}^{\infty} (3(n))^2 dn = \int_{0}^{\infty} (fs(s))^2 ds$
Here $\int_{0}^{\infty} (n)^2 dn = \int_{0}^{\infty} (fs(s))^2 ds$
 $\int_{0}^{\infty} e^{-2an} dn = \int_{0}^{\infty} \sqrt{\frac{2}{\pi}} \int_{a^2 + s^2}^{\infty} ds$
 $\frac{e^{-2an}}{-3a} \int_{0}^{\infty} dn = \frac{2}{\pi} \int_{0}^{\infty} (\frac{s}{a^2 + s^2})^2 ds$
 $\frac{1}{2a} \cdot \frac{\pi}{2} = \int_{0}^{\infty} (\frac{s}{a^2 + s^2})^2 ds$
put $s = n$
 $\frac{\pi}{4a} = \int_{0}^{\infty} (\frac{\pi}{a^2 + a^2})^2 dn$.



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DEPARTMENT OF MATHEMATICS

UNIT-IV FOURIER TRANSFORM

2) Evaluate J² (213402) (2124b2) de using transforms. White $F_s(s) = F_s[f(n)] = \sqrt{\frac{2}{41}} \int_{-\frac{2}{4}}^{\infty} e^{-an} e^{n} sn dn = \sqrt{\frac{2}{41}} \left[\frac{s}{a^2 f s^2}\right]$ $G_{3}(s) = F_{s}[g(n)] = \sqrt{2} \int e^{-bn} sn dn = \sqrt{2} \left[\frac{s}{b^{2} + s} \right]$ paeseval's Identity: Herefuns= e-an, gens=e-bn = $\int_{0}^{\infty} F_{s}(s) G_{s}(s) ds$ $\int_{0}^{\infty} e^{-an} e^{-bn} dn = \int_{0}^{\infty} F_{s}[g(n)] F_{s}[g(n)] ds$ $\int_{0}^{\infty} e^{-(a+b)n} dn = \int_{0}^{\infty} \sqrt{\frac{2}{11}} \left[\frac{s}{s^{2}+a^{2}} \right] + \sqrt{\frac{2}{11}} \left[\frac{s}{s^{2}+b^{2}} \right] ds$ $\frac{e^{-(a+b)}}{-(a+b)} \int_{0}^{\infty} = \frac{2}{\pi} \int \frac{3}{(s^{2}+a^{2})(s^{2}+b^{2})} ds$ $\frac{1}{a+b} \cdot \frac{\pi}{2} = \int \frac{3}{(s^{2}+a^{2})(s^{2}+b^{2})} ds$ hud $s=\pi$ $\int \frac{3}{a+b} \frac{3}{a+b} ds$ put s=n $\frac{\pi}{2(a+b)} = \int_{0}^{\infty} \frac{n^2}{(n^2+a^2)(n^2+b^2)} dn$.

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DEPARTMENT OF MATHEMATICS UNIT-IV FOURIER TRANSFORM

Using transforms evaluate: (1) $\int \frac{\partial}{(n^2 + q^2)^2}$ (ii) $\int \frac{\partial}{\partial s} \frac{ds}{(s^2 + 4)(s^2 + 1)}$ (iii) $\int \frac{\partial}{\partial r} \frac{n^2}{(n^2 + q)(n^2 + 16)}$