

Course Code & Title: 18MAB201T-Transforms and Boundary Value Problems

Year & Sem: II/III, Unit: IV

Tutorial 3

Part A

1	Define convolution $f * g$ of two functions $f(x)$ and $g(x)$.
2	Write down the expressions for $F[f(x) * g(x)]$ and $F^{-1}[f(x) * g(x)]$.
3	State the Parseval's identity.
4.	Write down the values of $\int_0^\infty e^{-x^2} dx$, $\int_0^\infty \frac{\sin(x)}{x} dx$, $\int_0^\infty \frac{\sin^2 x}{x^2} dx$ and $\int_0^\infty \frac{\sin^4 x}{x^4} dx$.

Part B

5.	Find the value of $\int_0^\infty \frac{\sin^2 x}{x^2} dx$ using Parseval's identity.
6.	Find the Fourier transform of $f(x) = 1 - x $, if $ x < 1$ and hence find the value of $\int_0^\infty \frac{\sin^4 x}{x^4} dx$ by using the Parseval's identity.
7.	Using Parseval's identity evaluate $\int_0^\infty \frac{ds}{(a^2+s^2)^2} \text{ and } \int_0^\infty \frac{ds}{(a^2+s^2)(b^2+s^2)}.$
8.	Show that $F[f'(x)] = -isF(s), F[f^n(x)] = (-is)^n F(s).$
9.	Show that $F_c[f'(x)] = -\sqrt{\frac{2}{\pi}} f(0) + sF_s(s) \text{ and } F_s[f'(x)] = -sF_c(s)$ By assuming that $f(x) \rightarrow 0$ as $x \rightarrow \infty$.