Subject: **Fourier Series and Integral Transforms**

Prerequisite: None

**Laplace Transform:** Definition of Laplace Transform, linearity property, conditions for existence of Laplace Transform **[4 L]**. First and second shifting properties, Laplace Transform of derivatives and integrals, unit step functions, Dirac delta-function, error function. Differentiation and integration of transforms, convolution theorem, inversion, periodic functions **[6 L]**. Applications: Evaluation of integrals by Laplace Transform. Solution of initial and boundary value problems **[5L]**.

**Fourier Series**: Periodic functions, Fourier series representation of a function **[3L]**. Convergence of Fourier Series **[3 L]**. Half range series, sine and cosine series, Parseval’s identity, Fourier Integral Representation of a function **[4L]**.

**Fourier Transform:** Fourier Transform, Fourier sine and cosine transforms **[3L]**. Linearity, scaling, frequency shifting and time shifting properties, self-reciprocity of Fourier Transform, convolution theorem **[3L]**. Applications to boundary value problems **[5L]**.

Brief Introduction of Z-Transform, Mellin transform and Wavelet Transform **[4L]**.

TOTAL LECTURES: 40

**Reference Books:**

[1] Pinkus, A. and Zafrany, S. (1997). *Fourier Series and Integral Transforms*. Cambridge University Press. United Kingdom.

[2] Debnath, L. and Bhatta, D. (2007). *Integral Transforms and Their Applications*. Second Edition. Chapman and Hall/CRC (Taylor and Francis Group). New York.

[3] Dyke, P.P.G. (2001). *An Introduction to Laplace Transforms and Fourier Series*. Springer-Verlag London Ltd.

[4] Kreyszig, E. (1993). *Advanced Engineering Mathematics*. Seventh Edition. John Willey & Sons, Inc., New York.

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