

**AIM:**

To facilitate the understanding of the principles and to cultivate the art of formulating physical problems in the language of mathematics.

**OBJECTIVE:**

- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems
- To acquaint the student with Fourier transform techniques used in wide variety of situations in which the functions used are not periodic
- To introduce the effective mathematical tools for the solutions of partial differential equations that model physical processes
- To develop Z- transform techniques which will perform the same task for discrete time systems as Laplace Transform, a valuable aid in analysis of continuous time systems

**UNIT I           FOURIER SERIES****9+3**

Dirichlet's conditions – General Fourier series – Odd and even functions – Half-range Sine and Cosine series – Complex form of Fourier series – Parseval's identity – Harmonic Analysis.

**UNIT II           FOURIER TRANSFORM****9+3**

Fourier integral theorem – Fourier transform pair-Sine and Cosine transforms – Properties – Transform of elementary functions – Convolution theorem – Parseval's identity.

**UNIT III          PARTIAL DIFFERENTIAL EQUATIONS****9+3**

Formation – Solutions of first order equations – Standard types and Equations reducible to standard types – Singular solutions – Lagrange's Linear equation – Integral surface passing through a given curve – Solution of linear equations of higher order with constant coefficients.

**UNIT IV          APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS****9+3**

Method of separation of Variables – Solutions of one dimensional wave equation and one-dimensional heat equation – Steady state solution of two-dimensional heat equation – Fourier series solutions in Cartesian coordinates.

**UNIT V          Z – TRANSFORM AND DIFFERENCE EQUATIONS****9+3**

Z-transform – Elementary properties – Inverse Z-transform – Convolution theorem – Initial and Final value theorems – Formation of difference equation – Solution of difference equation using Z-transform.

**L: 45, T: 15, TOTAL= 60 PERIODS****TEXT BOOK:**

1. Grewal, B.S. "Higher Engineering Mathematics", Khanna Publications (2007)

**REFERENCES:**

1. Glyn James, "Advanced Modern Engineering Mathematics", Pearson Education (2007)
2. Ramana, B.V. "Higher Engineering Mathematics" Tata McGraw Hill (2007).
3. Bali, N.P. and Manish Goyal, "A Text Book of Engineering 7<sup>th</sup> Edition (2007) Lakshmi Publications (P) Limited, New Delhi.