

LAPLACE AND FOURIER TRANSFORMATIONS

Course No: **MM24003GE**

Semester: **M.A/M.Sc 3rd Semester**

Continuous Assessment: **Marks 10, Theory Marks: 40**

Total Credits: **02**

Total Marks: **50**

Time Duration: **1½ Hrs**

Objectives: To formulate and solve differential equations, illustrate Laplace and Fourier transform through practical applications and solve initial and boundary value problems using Laplace/Fourier transform.

Course Outcomes: Upon successful completion of this course, students will be able to: Solve differential equations with initial conditions using Laplace transform. Evaluate the Fourier transform of a continuous function and be familiar with its basic properties.

UNIT -I

Definition of Laplace transformation and some examples on Laplace transformation of elementary functions, piecewise continuity, sufficient conditions for the existence of Laplace transform, linearity property, first and second translation (shifting property), Laplace transform of derivatives, Laplace transform of integrals, Inverse Laplace transform, Inverse Laplace transform of derivatives and integrals, the convolution property, methods of finding inverse Laplace transform, the complex inversion formula, the Heaviside expansion formula.

UNIT -II

Periodic functions, Definition and examples of Fourier series, Dirichlet's conditions, determination of Fourier coefficients, even and odd functions and their Fourier expansion, change of interval, half range series. Fourier transform, inverse Fourier transform, Fourier sine and cosine transforms and their inversion, properties of Fourier transforms, Fourier transform of the derivative, convolution theorem, discrete Fourier transform and fast Fourier transform and their properties.

Recommended Books.

1. Murrey R. Spiegel, Laplace Transforms, Schaum's Outline Series, McGraw Hill Education.
2. I. N. Sneddon, The use of Integral Transforms, McGraw-Hill, Singapore 1972.
3. R. R. Goldberg, Fourier Transforms, Cambridge University Press, 1961.
4. D. Brain, Integral Transforms and their applications, Springer, 2002.