MATDSCT 4.1: Partial Differential Equations and Integral Transforms	
Teaching Hours: 4 Hours/Week	Credits: 4
Total Teaching Hours: 56 Hours	Max. Marks: 100 (SEE - 60 + I.A. – 40)

Course Learning Outcomes: This course will enable the students to
- Solve the Partial Differential Equations of the first order and second order.
- Formulate, classify and transform partial differential equations into canonical form.
- Solve linear and non-linear partial differential equations using various methods; and apply these methods to solving some physical problems.
- Able to solve wave equation and heat equation.
- Understand the concept of Laplace Transforms.
- Able to find the Fourier series and Fourier Transform of given functions.

Partial Differential Equations:

Unit I: Basic concepts–Formation of a partial differential equations by elimination of arbitrary constants and functions, Solution of partial differential equations –Lagrange's linear equation of the form $Pp + Qq = R$, Standard types of first order non-linear partial differential equations, The complete integrals of the non-linear equation by Charpit's method. **14Hrs**

Unit II: Homogeneous and non-homogeneous linear partial differential equations with constant coefficients, Partial differential equations of the second order. Classification of second-order partial differential equations, canonical forms. Solutions of the Heat equation and Wave equation (using Fourier series). **14Hrs**

Integral Transforms:

Unit III: Laplace Transforms: Definition, Basic Properties. Laplace transforms of some standard functions. Laplace transform of Periodic functions. Laplace transform of derivative and integral of a function. Convolution theorem. Inverse Laplace transforms and its properties. Solution of differential equations by using Laplace transforms. **14Hrs**

Unit IV: Fourier Series and Transforms: Periodic functions. Fourier Coefficients. Fourier series of functions with period 2L. Fourier series of even and odd functions. Half range Cosine and Sine series. Fourier Transforms - Finite Fourier Cosine and Sine transforms. **14Hrs**

Reference Books:

1. D. A. Murray, Introductory Course in Differential Equations, Orient and Longman, 2017.
2. H. T. H.Piaggio, Elementary Treatise on Differential Equations and their Applications, CBS Publisher & Distributors,Delhi,1985.
3. G. F. Simmons, Differential Equations, Tata McGrawHill, 1991.