Course Code	Course Title	C	H	I	E	T
17U5MMC9	Differential Equations	6	6	25	75	100

Learning Objectives
- To enable the students to understand the concepts of Ordinary Differential Equations & Partial Differential Equations and its applications.
- To provide the basic knowledge of solving Ordinary Differential Equations using Laplace Transforms.

Learning Outcomes

After successful completion of this course, students will be able to
- Explain the concepts of Differential Equation and Classify the Differential Equation with respect to their order and linearity.
- Solve Ordinary Differential Equation and Partial Differential Equation using various methods.
- Apply the concepts of Ordinary Differential Equation and Partial Differential Equation in real life problems.

Unit I Ordinary differential equations of the first order

Preliminaries (not included for the examination) – Exact differential equations – Conditions for the equation to be exact – Working rule for solving it – Integrating factors– Equations of the first order and of a degree higher than the first – Equations solvable for p – Solvable for x – Solvable for y – Clairaut's equations.

Unit II Ordinary linear differential equations of second and higher orders

Second and higher order linear differential equations with constant coefficients – Homogeneous linear equation with variable coefficients – Cauchy's Euler Homogeneous equations – Method of reduction of order – Transformation of the equation by change of the dependent variable – Method of variation of parameters – Simultaneous linear differential equations with constant coefficients.

Unit III Partial differential equations of first order

Partial differential equations – Formation of PDE's by the elimination of arbitrary constants – Formation of PDE's by eliminating the arbitrary functions – Lagranges' linear PDE's –Method of grouping and method of Lagrangian multipliers – Solving first order nonlinear PDE's – Standard forms.

Unit IV Higher order homogeneous and non-homogeneous PDE's

Solving second and higher order homogeneous PDE's with constant coefficients – Standard forms – Solving non-homogeneous PDE's.

Unit V Laplace transforms

Definition – Properties of Laplace transforms – Laplace transforms of some standard functions – Inverse Laplace transforms – Transform of derivatives and integrals – Laplace transform of periodic functions – Application of Laplace transforms to solve differential equations with constant coefficients and integral equations only.

Text Book:

M. K. Venkataraman and Mrs. Manorama Sridhar, Differential Equations and Laplace Transforms, 2004, The National Publishing Company.

Chapters:

Section A:2 (2.6, 2.7), 3, 4, 5, 6, 7 (7.1 – 7.4, 7.7), 9 (9.1 – 9.8, 9.13 –9.20).
Section B: 1 (1.1 – 1.18, 1.20).

Reference Books:

1. S.Arumugam and A. ThangapandiIssac, Differential equations and applications, Gamma Publishing House.
2. S.Narayanan and T. K. ManicavachagomPillay, Calculus – Vol. III (Differential equations and Fourier series), Reprint 2002, S. Viswanathan Printers and Publishers Private Ltd.