DSE4-N II Ordinary Differential Equations and Partial Differential

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Semester 6

Objectives

1. To introduce students to ordinary and partial differential equations with emphasis on their geometric interpretation in three dimensions and basic solution techniques.
2. To develop understanding of first-order and second-order partial differential equations, including their formation, classification, and methods of solution.
3. To familiarize students with important applications of partial differential equations such as Laplace, wave, and periodic equations using separation of variables.

Expected Outcomes

1. Students will be able to understand and solve basic ordinary and partial differential equations involving curves, surfaces, and Pfaffian forms.
2. Students will gain the ability to solve first-order and second-order linear partial differential equations using standard methods including complementary function and particular integral approaches.
3. Students will be able to classify partial differential equations and apply separation of variables method to solve Laplace, wave, and related equations.

UNIT 5: Introduction to Ordinary and Partial Differential Equations
5.1 Surfaces and Curves in Three Dimensions
5.2 Simultaneous Differential Equations of the First Order and the First Degree in Three Variables
5.3 Methods of Solution of $dx/P = dy/Q = dz/R$
5.4 Pfaffian Differential Forms and Equations
5.5 Solution of Pfaffian Differential Equations in Three Variables

UNIT 6: Partial Differential Equations
6.1 Introduction to Partial Differential Equations
6.2 Origin of First Order Partial Differential Equations
6.3 Linear Equations of First Order Equations
6.4 Integral Surfaces Passing Through Given Curve

UNIT 7: Second Order Partial Differential Equations
7.1 The Origin of Second Order Partial Differential Equations
7.2 Linear Partial Differential Equations with Constant Coefficients
7.3 Methods of Solving Linear Partial Differential Equations
7.3.1 Solution of Reducible Equations
7.3.2 Solution of Irreducible Equations with Constant Coefficients
7.3.3 Rules of Finding Complementary Functions
7.3.4 Rule of Finding Particular Integrals

UNIT 8: Classification of Partial Differential Equations

8.1 Classification of Second Order Partial Differential Equations, Canonical Forms
8.2 Solution of Laplace Equations by Separation Variables Methods
8.3 Solution of Periodic Differential Equations by Separation Variables Method
8.4 Solution of Wave Equation by Separation Variables Method