Math 225

Introduction to Differential Equations

COURSE MATH 225

SEMESTER I, 1440 – 1441 H

Department of Mathematics

Text Book:A FIRST COURSE IN DIFFERENTIAL EQUATIONS with Modeling Applications By DENNIS G. ZILL (Tenth edition)

Syllabus**:**

1. Classification of Differential equations and their origins
2. Methods of solution of first order differential equations, orthogonal trajectories
3. Linear equations with constant coefficients and variable coefficient
4. Linear system of equations, power series solutions of linear differential equation of the second order with polynomial coefficients.
5. Laplace transform and the convolution.

Chapters:

* **Chapter one** (**Introduction to Differential Equations)**:

 1.1 DEFINITIONS AND TERMINOLOGY

 1.2 INITIAL-VALUE PROBLEMS

* **Chapter two** (**First-Order Differential Equations)**:

2.2SEPARABLE EQUATIONS

 2.3LINEAR EQUATIONS

 2.4Exact EQUATIONS

 2.5SOLUTIONS BY SUBSTITUTIONS

* **Orthogonal trajectories.**
* **Chapter four** (**Higher-Order Differential Equations)**:

 4.1 PRELIMINARY THEORY—LINEAR EQUATIONS

 4.2 REDUCTION OF ORDER

 4.3 HOMOGENEOUS LINEAR EQUATIONS WITH CONSTANT COEFFICIENTS

 4.4 UNDETERMINED COEFFICIENTS—SUPERPOSITION APPROACH

 4.5 UNDETERMINED COEFFICIENTS —ANNIHILATOR APPROACH

 4.6 VARIATION OF PARAMETERS

 4.7 CAUCHY-EULER EQUATION

 4.9 SOLVING SYSTEMS OF LINEAR DEs BY ELIMINATION

* **Chapter six** (**Series Solutions of Linear Equations)**:

 6.1 REVIEW OF POWER SERIES

 6.2 SOLUTIONS ABOUT ORDINARY POINTS

* **Chapter Seven** (**The Laplace Transform**):

7.1 DEFINITION OF THE LAPLACE TRANSFORM

7.2 INVERSE TRANSFORMS AND TRANSFORMS OF DERIVATIVES

7.3 OPERATIONAL PROPERTIES