Dedication

To my family

To my teachers

To my friends

To who will be my wife in the future

The contents

Subject **Page**

ACKNOWLEDGMENT:

I would like express my deep sense of gratitude record my thanks to my supervisor *Dr.Tarig M. Elzaki* .

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Abstract:

This research deals with the theory and applications of the Mellin transform. We derived the Mellin transform and its inverse from the complex Fourier transform. This is followed by several examples and the basic operational properties of Mellin transforms. We studied several applications of Mellin transforms to boundary value problems , integral equations and to summation of infinite series .Finally we appling the double Mellin transform and its inverse to solve some particular partial differential equations.

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INTRODUCTION:

The concept of an integral transform originated from the celebrated Fourier integral formula. The importance of integral transforms is that they provide powerful operational methods for solving initial value problems and initial -boundary value problems for linear differential and integral equations. In fact, one of the main impulses for the development of the operational calculus of integral transforms was the study of differential and integral equations arising in applied mathematics, mathematical physics, and engineering science; it was in this setting that integral transforms arose and achieved their early successes. With ever greater demand for mathematical methods to provide both theory and applications for science and engineering, the utility and interest of integral transforms seems more clearly established than ever. In spite of the fact that integral transforms have many mathematical and physical applications, their use is still predominant in advanced study and research.

Historically, Riemann (1876) first recognized the Mellin transform in his famous memoir on prime numbers. Its explicit formulation was given by Cahen(1894). Almost simultaneously, Mellin (1896, 1902) gave an elaborate discussion of the Mellin transform and its inversion formula.