Preface

Generating functions play an important role in the investigation of various useful properties of the sequences which they generate. Because of its growing importance, the present thesis is designed so that certain double generating functions which are bilinear, bilateral and partly bilateral and partly unilateral are contained for a fairly wide variety of special functions in one, two or more variables. Such generating functions are obtained in general by using series manipulation techniques. Integral transforms play an important role of various fields in physics. With the use of Laplace, Hankel and Mellin transforms we extract complete and rigorous asymptotic expansion of the generalized Voigt function, which occur frequently in the theory of neutron reaction and are of great value in the theory of spectral line profile.

The present thesis comprises of six chapters each chapter is divided into a number of sections. Definitions and equations have been numbered chapter wise. The section number is followed by the number of equation thus 3.2.1 refers to equation number 1 of section 3.2.

A brief review of some important special functions, some integral transformations the definitions and notations which commonly arise in practice is presented in chapter 1. This chapter is also intended to make the thesis self contained as much as possible.
Chapter 2 aims at presenting some known representation of Voigt function and multiindices and multivariables study of the unified (generalized) Voigt functions are given which play an important role in several diverse field of physics. Some representation and series expansion including multidimensional classical polynomials (Laguerre and Hermite) of mathematical physics are established.

Chapter 3 provides an interesting extension of the work of various authors, e.g., Exton [22], Srivastava and Miller [80] and Klusch [45]. A new integral involving Hyper-Bessel function is presented and multiindices representation of unified Voigt function is obtained.

Chapter 4 begins by introducing a new class of interesting generating relation (partly bilateral and partly unilateral) involving Mittag-Leffler’s functions. The result of Exton [21] which is partly bilateral and partly unilateral is generalized. We used series manipulation technique to construct explicitly the appropriate generating functions. A number of known results of Pathan and Yasmeen [58], [59] and Exton [21] are obtained as special cases.

Chapter 5 presents certain class of multiple generating function involving Mittag-Leffler’s functions, $E_a$, $E_{a,\beta}$, and entire function intimately connected with $E_{a,\beta}$, used by Wright [89], [92]. A generating function involving Mittag-Leffler’s function is given as result I and its generalization as result II and result III deals in a similar way with the entire functions. Some interesting (known and new) multiple generating functions are also given as special cases and a
generating function of Hyper-Bessel function is also obtained.

In chapter 6 we obtain a general result on multiple generating function involving product of Hubble and Srivastava function [32] with essentially arbitrary coefficient. By appropriate specializing these co-efficient a number of (known and new) multiple generating functions are obtained as special cases.

A part of our work has been accepted/Communicated for publication. A list of papers is given below:


(ii) On certain class of multiple generating functions. (Communicated).

(iii) On Multiindices and Multivariable presentations of the Voigt functions (Communicated).

(iv) A certain class of multiple generating functions involving Mittag-Leffler’s function (Communicated).

(v) A new generalization of unified Voigt functions (communicated).