## Contents

Declaration ................................................................. ii
Certificate ................................................................. iii
Contents ................................................................. iv
Acknowledgement ........................................................... vii
Preface ................................................................. ix
List of Figures .............................................................. xi

### 1 Introduction and Basic results

1.1 Positive linear operators ............................................... 3
   1.1.1 Definitions and properties of positive linear operators ........... 3
   1.1.2 Some positive linear operators ........................................ 4
1.2 Approximation of functions by positive linear operators ............. 7
   1.2.1 Simultaneous Approximation ........................................... 7
   1.2.2 Statistical Approximation ............................................. 7
   1.2.3 Local and Global approximation ...................................... 8
   1.2.4 Different types of moduli of continuity ......................... 10
   1.2.5 K-functionals and their relationship to the moduli of continuity .. 11
1.3 Basic of quantum calculus ............................................. 12
   1.3.1 Basic of q-calculus .................................................. 12
   1.3.2 Basic of (p,q)-calculus ............................................ 15

### 2 Stancu-variant of generalized Baskakov operators

2.1 Approximation properties of $L_{n,d}^{\alpha,\beta}$ ........................ 18
2.2 The degree of approximation .......................................... 21
2.3 Direct Estimate ..................................................... 23
2.4 Generalized Baskakov Kantorovich Stancu Operators .................. 26
2.5 Basic results ....................................................... 26
2.6 Rate of convergence .................................................. 28
## Contents

2.7 Direct Estimates ......................................... 30
2.8 Weighted approximation ................................ 35

3 Szász-Durrmeyer operators based on Dunkl analogue 36
3.1 Preliminaries ........................................... 37
3.2 Rate of convergence .................................... 38
3.3 Local approximation .................................... 39
3.4 Weighted approximation ................................ 43
3.5 A-Statistical approximation ............................ 46

4 A generalization of Szász-type operators which preserves constant and quadratic test functions 50
4.1 Basic Estimates ......................................... 51
4.2 Rate of convergence .................................... 52
4.3 Local Approximation Results .......................... 54
4.4 Weighted Korovkin type theorem ..................... 58

5 Modified Szász operators involving Charlier polynomials based on two parameters 60
5.1 Preliminaries ........................................... 60
5.2 Rate of convergence of the operators $T_{n,a}^{\alpha,\beta}$ ............... 62
5.3 Simultaneous Approximation .......................... 62
5.4 Local Approximation Results .......................... 64
5.5 Weighted Approximation ............................... 67
5.6 Statistical approximation .............................. 68

6 Approximation properties of $(p, q)$-variant of Stancu-Schurer operators 70
6.1 Basic estimates for $(p, q)$-Schurer-Stancu operators ............... 71
6.2 Convergence properties of $S_{n,r}^{\alpha,\beta} (f; x, p_n, q_n)$ ............... 73
6.3 Direct results for $S_{n,r}^{\alpha,\beta} (f; x, p_n, q_n)$ .................. 78
6.4 Construction of $(p, q)$-Bivariate-Schurer-Stancu operators .......... 82
6.5 Main Results ........................................... 84
6.6 Local approximations ................................. 86
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.7</td>
<td>$(p,q)$-Bivariate-Bernstein-Chlodovsky operators</td>
<td>90</td>
</tr>
<tr>
<td>6.8</td>
<td>Main Results</td>
<td>93</td>
</tr>
</tbody>
</table>

Bibliography

List of Publications based on Ph.D. research work and conferences
attended/presented papers

Ph.D. Ordinance

Curriculum Vitae