

# Table of Contents

<b>Abstract</b>	ii
<b>Acknowledgements</b>	v
<b>Table of Contents</b>	vi
<b>1 Introduction</b>	1
1.1 General introduction . . . . .	1
1.2 A brief historical overview . . . . .	1
1.3 Preliminaries . . . . .	3
1.3.1 Formal matrix rings . . . . .	3
1.3.2 Some properties of idempotents . . . . .	4
1.3.3 Clean ring . . . . .	4
1.3.4 Clean index of a ring . . . . .	5
1.3.5 Nil clean rings . . . . .	6
1.3.6 Weakly clean ring . . . . .	6
<b>2 Nil clean index of rings</b>	7
2.1 Introduction . . . . .	7
2.2 Elementary properties . . . . .	8
2.3 Rings of nil clean index 1 . . . . .	19
2.4 Rings of nil clean index 2 . . . . .	23
2.5 Rings of nil clean index 3 . . . . .	25
2.6 Formal triangular ring with nil clean index 4 . . . . .	29

<b>3 Weak clean index of a ring</b>	<b>34</b>
3.1 Introduction . . . . .	34
3.2 Basic properties . . . . .	34
3.3 Rings with weak clean index 1, 2 and 3 . . . . .	40
<b>4 Weak nil clean rings</b>	<b>51</b>
4.1 Introduction . . . . .	51
4.2 Weak nil clean rings . . . . .	52
4.3 S-weak nil clean rings . . . . .	58
4.4 More results on weak nil clean rings . . . . .	60
4.5 Weak J-clean rings . . . . .	61
<b>5 Nil clean graph of rings</b>	<b>63</b>
5.1 Introduction . . . . .	63
5.2 Basic properties . . . . .	63
5.3 Invariants of a nil clean graph . . . . .	69
5.3.1 Girth of $G_N(R)$ . . . . .	69
5.3.2 Dominating set . . . . .	73
5.3.3 Chromatic index . . . . .	75
5.3.4 Diameter . . . . .	76
<b>Publications</b>	<b>87</b>