

CONTENTS

	<i>PAGE NO</i>
<i>DECLARATION</i>	<i>I</i>
<i>CERTIFICATE</i>	<i>II</i>
<i>ACKNOWLEDGEMENT</i>	<i>III</i>
<i>PREFACE</i>	<i>V</i>
<i>LIST OF PUBLICATIONS</i>	<i>VII</i>
<i>SYNOPSIS</i>	<i>VIII</i>

Chapter I INTRODUCTION

<i>1 1 Introduction</i>	<i>1</i>
<i>1 2 The Quark Model</i>	<i>3</i>
<i>1 3 The Parton Model</i>	<i>5</i>
<i>1 4 Quantum Chromodynamics</i>	<i>7</i>
<i>1 5 Asymptotic Freedom and Confinement</i>	<i>10</i>
<i>1 6 Operator Product Expansion</i>	<i>14</i>
<i>1 7 Chiral Symmetry</i>	<i>15</i>
<i>1 8 PCAC</i>	<i>18</i>
<i>1 9 OZI Rule and Its Violation</i>	<i>20</i>
<i>1.10 Effective Field Theory</i>	<i>22</i>
<i>1 11 Anomaly</i>	<i>25</i>
<i>1 12 Proton Spin Problem</i>	<i>27</i>
<i>1 13 References</i>	<i>30</i>

Chapter II SPIN STUDIES OF NUCLEONS IN A STATISTICAL MODEL

<i>2 1 Introduction</i>	<i>32</i>
<i>2 2 Sea and its Structure</i>	<i>35</i>
<i>2 3 Sea with Pseudoscalars</i>	<i>50</i>
<i>2 4 Sea with Suppressed Higher Multiplicity States</i>	<i>51</i>
<i>2 5 Summary and Conclusion</i>	<i>54</i>
<i>2 6 References</i>	<i>57</i>

Chapter III CHARGE SYMMETRY BREAKING IN PION-NUCLEON COUPLING CONSTANT: QCD SUM RULE APPROACH

<i>3 1 Introduction</i>	<i>60</i>
<i>3 2 A Model Calculation in QCD_{SR}: Proton Mass</i>	<i>61</i>
<i>3 3 Isospin Splitting in Pion-Nucleon Coupling Constant</i>	<i>67</i>
<i>3 4 Sum Rules for Pion-Nucleon Couplings</i>	<i>71</i>
<i>3 5 Analysis of Results and Discussion</i>	<i>76</i>
<i>3 6 References</i>	<i>84</i>

Chapter IV GLUONIC CONTRIBUTION TO THE SELF-ENERGY OF NUCLEON

4 1 Introduction	86
4 2 The Low Energy Effective Lagrangian	88
4 3 Regularization of the Self-Mass	92
4 4 References	98

Chapter V THE DERIVATIVE OF THE TOPOLOGICAL CHARGE SUSCEPTIBILITY AT ZERO MOMENTUM AND AN ESTIMATE OF η' MASS IN THE CHIRAL LIMIT

5 1 Introduction	100
5 2 Calculation of the First Derivative of Topological Susceptibility	101
5 3 η' -Mass in the Chiral Limit	108
5 4 Results and Discussion	110
5 5 References	114

Chapter VI SUMMARY AND CONCLUSIONS 115