

CONTENTS

Abstract		I
Certificate		II
Acknowledgments		III
Nomenclature		IV
1	INTRODUCTION	
	1.0 General	1
	1.1 Centrifugal Blower	2
	1.2 Arrangement of Volute Casing	6
	1.3 Role of impeller	11
	1.4 Flow Phenomenon in Blower Casing	14
	1.5 Performance Characteristic of a Blower	15
	1.6 Summary	21
2	REVIEW OF LITERATURE	
	2.0 General	23
	2.1 Geometric Parameters	24
	2.2 Experimental Measurement of Flow	27
	2.3 Recent Development	31
	2.4 Scope and Objectives of the Present Work	37
	2.5 Summary	40
3	DESIGN AND OPTIMIZATION	
	3.0 General	42
	3.1 Impeller Design	43
	3.2 Volute Casing Design	56
	3.3 Calculated Parameters	60

	3.4	Concept of Mismatching for Impeller	63
	3.5	Optimization	68
	3.6	Material Selection for Volute Casing	70
	3.7	Summary	73
4	EXPERIMENTAL PROGRAM		
	4.0	General	74
	4.1	Fabrication of Volute Casing	75
	4.2	Experimental Setup	78
	4.3	Instrumentation	79
	4.4	Procedure for Measurement of Flow	89
	4.5	Experimental Dilemma	91
	4.6	Summary	92
5	CFD APPROACH		
	5.0	General	93
	5.1	Overview of CFD in Blower	95
	5.2	Structure of CFD analysis in Blower	96
	5.3	Mesh Generation for Blower	97
	5.4	Boundary Conditions for Blower Casing	102
	5.5	Simulation for the Blower Casing	105
	5.6	Solver Manager for CFD in Blower	106
	5.7	Results of CFD Simulation	107
	5.8	Static Analysis of Blower Casing	108
	5.9	Summary	111
6	RESULT & DISCUSSION		
	6.0	General	112
	6.1	Experimental Results	112
	6.2	Comparison of Flow Parameters	120
	6.3	Mismatching of Impeller with Volute Casing	122

	6.4	CFD Analysis	123
	6.5	Uncertainty Analysis	125
	6.6	Optimization	125
	6.7	Experimental Analysis of Optimized Design	129
	6.8	Static and Dynamic Analysis	131
	6.9	Summary	132
7	CONCLUSIONS AND FUTURE SCOPE		
	7.0	Conclusions	133
	7.1	Future Scope	135
	APPENDIX – I FIGURE & CHARTS		136
	APPENDIX – II UNCERTAINTY ANALYSIS		191
	REFERENCES		194