

TABLE OF CONTENTS

Certificate	ii
Declaration by the candidate	iii
Copyright transfer certificate	iv
Acknowledgements	v
Table of contents	viii
List of figures	xi
List of tables	xiv
List of abbreviations	xvii
Preface	xviii
CHAPTER 1: INTRODUCTION.....	1
1.1 Overview	1
1.2 Challenges in Maternal Healthcare in India	4
1.2.1 Availability and accessibility.....	4
1.2.2 Service quality	6
1.2.3 Population growth.....	6
1.3 Literature Review	7
1.3.1 Facility location problem.....	8
1.3.2 General healthcare facility location.....	9
1.4.4 Maternal healthcare facility location	22
1.4.5 Bibliometric mapping	23
1.4 Research Gaps	27
1.5 Present Work	31
1.5.1 Research scope	31
1.5.2 Research objectives	34
1.6 Organization of the Thesis	35
CHAPTER 2: MATERNAL HEALTHCARE FACILITY PLANNING WITH FULL AVAILABILITY WITHIN REACH.....	37
2.1 Introduction	37
2.2 The Problem	38
2.3 The Mathematical Model	41

2.4 An Illustrative Example	44
2.5 Solution Approaches	52
2.5.1 Valid inequalities	53
2.5.2 Sequential approach.....	56
2.6 Computational Experiments	61
2.6.1 Generation of test instances	61
2.6.2 Experimental results on the suitability of the proposed approaches	63
2.6.3 Experimental results on the efficacy of the proposed valid inequalities	68
2.7 Sensitivity Analysis.....	71
2.7.1 Impact of coverage distance	71
2.7.2 Impact of change in the referral proportion.....	74
2.7.3 Impact of change in the capacity of maternal healthcare facilities.....	76
2.7.4 Impact of change in the fixed cost.....	79
2.8 Conclusions	80
CHAPTER 3: MATERNAL HEALTHCARE FACILITY PLANNING PENALTY ON OVERBURDENING.....	83
3.1 Introduction	83
3.2 The Problem	85
3.3 The Mathematical Model	86
3.4 Metaheuristics Used as Solution Approaches	89
3.4.1 Particle swarm optimization	89
3.4.2 Artificial bee colony algorithm.....	94
3.4.3 JAYA algorithm	100
3.5 Performance Study of the Proposed Metaheuristics	104
3.6.1 Generation of test instances	104
3.6.2 Experimental results and discussion.....	105
3.6.3 Comparative performance analysis of proposed metaheuristics	109
3.5 Impact of change in demand and penalty.....	111
3.6 Hybrid Optimization-Simulation Framework with Normally Varying Demand	114
3.6.1 Optimization phase.....	114
3.6.2 Simulation phase.....	115
3.6.3 Simulation for example problem	119
3.6.4 Simulation on randomly generated problems.....	121

3.4.5 Observations	125
3.7 Conclusions	126
CHAPTER 4: MULTI-PERIOD MATERNAL HEALTHCARE FACILITY PLANNING CONSIDERING POPULATION GROWTH	129
4.1 Introduction	129
4.2 The Problem	130
4.3 Model Formulation.....	132
4.4 Solution Approaches	139
4.5 Benders decomposition	140
4.5.1 Classical Benders decomposition	144
4.5.2 Accelerated Benders decomposition	146
4.5.3 Benders type heuristic	154
4.6 Particle Swarm Optimization	156
4.7 Hybridized Simulated Annealing	164
4.7.1 Set covering problem.....	165
4.7.2 Fix-and-optimize	166
4.7.3 Implementation of Simulated annealing.....	168
4.8 Computational Experiments.....	173
4.8.1 Generation of test instances	173
4.8.2 Experimental results	176
4.9 Integrated vs Disaggregated Planning.....	193
4.10 Case example.....	200
4.11 Conclusions	204
CHAPTER 5: CONCLUSIONS AND SCOPE FOR FURTHER WORK	207
5.1 Conclusions	207
5.2 Managerial Implications of the Study	211
5.3 Scope for Future Research	212
REFERENCES.....	213
APPENDIX-A.....	237
LIST OF PUBLICATIONS	241
BIBLIOGRAPHY	243