List of Tables

2.1 Results of Test Functions following PSO Approach 62
2.2 PSO parameters and their levels 62
2.3 L_9 orthogonal array 62
2.4 Required number of function evaluation in different seeds and S/N ratio 63
2.5 S/N response table for function evaluation 64
2.6 Results of the ANOVA for function evaluation 64
2.7 Benchmark functions used for comparison 66
2.8 Comparison of results of test functions for $n = 30$ 67
2.9 Results of some test functions for different number of iterations . . . 67
2.10 Benchmark continuous test functions used for the testing of MMCABC 72
2.11 Results of continuous test functions (for $n = 30$) using MMCABC . . 72
2.12 Mixed integer test functions used for the testing of MMCABC . . . 73
2.13 Results of mixed integer test functions (for $n_1 = 30$ and $n_2 = 10$) using MMCABC 73
2.14 Some problems for constraint handling 74

3.1 Optimum Results for Example 3.1 109
3.2 Parametric study of k for Example 3.1 using PSO technique 109
3.3 Values of TP_R, TP_W due to different F in CS for Example 3.1 using PSO technique 109
3.4 Sensitivity Analysis of c and d for Example 3.1 using PSO technique 110
3.5 Results of Fuzzy and Rough model following PSO for Example 3.1 . 111
3.6 Optimum Results for Example 3.2 112
3.7 Results of Fuzzy and Rough model following PSO for Example 3.2 . 113
3.8 Values for ANOVA test 114
3.9 Computational time and number of function evaluation in different approaches 114
3.10 Parametric Study on n for Retailer's Profit 132
3.11 Parametric Study on m for Wholesaler's Profit 132
3.12 Values of Different Expressions for the Wholesaler 132
3.13 Near-Optimum Results in NCS using PSO technique 133
3.14 Values of Total Profit (TP) for different m and n using PSO technique 133
3.15 Values of TP_R, TP_W due to different F in CS using PSO technique 133
3.16 Near-Optimum Results in CS using PSO technique 133
3.17 Results of fuzzy supply chain model following Credibility Measure approach 134

3.18 Parametric Study of N to maximize Manufacturer's Profit in NCS for Model 3.3.1 . . . 153
3.19 Compare the Manufacturer's Profit for $N = 4$ with different runs in NCS for Model 3.3.1 . . . 153
3.20 Parametric Study of M to maximize Supplier's Profit in NCS for Model 3.3.1 . . . 153
3.21 Parametric Study of N & M to maximize Joint Profit in CS for Model 3.3.1 . . . 154
3.22 Individual & Joint Profit for different values of F in CS for Model 3.3.1 . . . 155
3.23 Individual & Joint Profit in NCS and CS for Model 3.3.1 . . . 155
3.24 Parametric Study of N to maximize Manufacturer's Profit in NCS for Model 3.3.2 . . . 156
3.25 Parametric Study of M to maximize Supplier's Profit in NCS for Model 3.3.2 . . . 156
3.26 Parametric Study of N & M to maximize Joint Profit in CS for Model 3.3.2 . . . 156
3.27 Individual & Joint Profit for different values of F in CS for Model 3.3.2 . . . 157
3.28 Individual & Joint Profit in NCS and CS for Model 3.3.2 . . . 157

4.1 Optimum Results of Model 4.1.1 and Model 4.1.1.1 using PSO technique and Lingo Software . . . 183
4.2 Values of Π_R, Π_S in Model 4.1.1 due to different F in CS using PSO technique . . . 184
4.3 Optimum Results of Model 4.1.1.2 and Model 4.1.1.3 using PSO technique . . . 184
4.4 Optimum Results of Model 4.1.2 using PSO technique . . . 185
4.5 Optimum Results of Model 4.1.2.1 using PSO technique . . . 186
4.6 Optimum Results of Model 4.1.3 using PSO technique . . . 186
4.7 Optimum Results of Model 4.1.3.1 using PSO technique . . . 187
4.8 Optimum Results of Crisp Model in NCS and CS using PSO technique and Lingo Software . . . 204
4.9 Values of Π_R, Π_S due to different F in CS using PSO technique . . . 204
4.10 Results of Fuzzy model following GMIV approach . . . 205
4.11 Results of Fuzzy model following Credibility Measure approach . . . 205
4.12 Values for ANOVA test . . . 206
4.13 Input data of Crisp model for Example 4.3 and Example 4.6 . . . 225
4.14 Results of Crisp model in NCS for Example 4.3 . . . 226
4.15 Values of Z_R and Z_W for different F of Crisp model in CS for Example 4.3 . . . 226
4.16 Results of Crisp model in CS for Example 4.3 . . . 227
4.17 Input data of Fuzzy model for Example 4.4 . . . 227
4.18 Results of Fuzzy model in NCS . . . 227
4.19 Results of Fuzzy model in CS . . . 227
4.20 Input data of Rough model for Example 4.5 . . . 228
4.21 Results of Rough model in NCS . . . 228

4.22 Results of Rough model in CS 228
4.23 Results of Crisp model in NCS for Example 4.6 229
4.24 Results of Crisp model in CS for Example 4.6 229
4.25 Input data of Crisp model for Example 4.7 (for $i = 1, 2, 3$) and Example 4.10 (for $i = 1, 2, 3, 4$) 260
4.26 Results of Crisp model in NCS for Example 4.7 260
4.27 Values of Z_R and Z_W for different F of Crisp model in CS for Example 4.7 261
4.28 Results of Crisp model in CS for Example 4.7 261
4.29 Parametric study of δ in CS for Example 4.7 262
4.30 Parametric study of γ_1 in CS for Example 4.7 262
4.31 Parametric study of γ_2 in CS for Example 4.7 263
4.32 Input data of Fuzzy and Rough model for Example 4.8 and Example 4.9 respectively 264
4.33 Results of Fuzzy model for Example 4.8 264
4.34 Results of Rough model for Example 4.9 264
4.35 Results of Crisp model in NCS for Example 4.10 265
4.36 Results of Crisp model in CS for Example 4.10 265