List of Tables

2.1 Treatment Combination and Responses 46
2.2 Main Effects 46
2.3 Symbols for Treatment Combinations 49
2.4 Table of Signs for Calculating Effects in $2^3$ Experiments 52
2.5 Blocking 53

3.1 Central Composite Rotatable Designs 66
3.2 Interpretation of the Canonical Equation 71

4.1 L4 Orthogonal Array Matrix 78
4.2 L8 Orthogonal Array Matrix 78

5.1 Machining parameters and their levels 94
5.2 Experimental Layout Using L8 Orthogonal Array 95
5.3 Experimental Results for EWR, MRR and OC 96
5.4 Main effects and their difference on electrode wear rate 98
5.5 Main effects and their difference on material removal rate 98
5.6 Main effects and their difference on overcut 98
5.7 ANOVA of electrode wear rate 101
5.8 Optimum conditions and performance of EWR 101
5.9 Material removal rate ANOVA 102
5.10 Optimum conditions and performance for MRR 102
5.11 ANOVA of Overcut 103
5.12 Optimum conditions and performance for Overcut 103
5.13 Comparison of expected and actual values of EWR 103
5.14 Comparison of expected and actual values of MRR 104
6.1 Design Matrix
6.2 First Order Design for $K = 3$
6.3 Formulae for Analysis of Variance for First Order Model
6.4 Variables and Their Levels
6.5 Experimental Conditions with Run Numbers
6.6 Design Matrix and Responses
6.7 ANOVA of OC (95% confidence level)
6.8 ANOVA of MRR (95% confidence level)
6.9 ANOVA of EWR (95% confidence level)
6.10 Comparison of predicted and actual values of EWR
6.11 Comparison of predicted and actual values of MRR
6.12 Comparison of predicted and actual values of OC
6.13 Calculation of path of steepest ascent/decent for EWR
6.14 Calculation of path of steepest ascent/decent for MRR
6.15 Calculation of path of steepest ascent/decent for OC
6.16 Steepest ascent/decent path of EWR and MRR

7.1 Central Composite Design used in the experiment
7.2 Different Variables Used in the Experiment and their Levels
7.3 Design Matrix and Responses of C-C composite machined with copper electrodes
7.4 Design Matrix and Responses of C-C composite machined with graphite electrodes
7.5 ANOVA of Overcut (Copper electrode)
7.6 ANOVA of Overcut (Graphite electrode)
7.7 Variation of OC w. r. to $V_g$
7.8 Variation of OC w. r. to $I_p$
7.9 Variation of OC w. r. to $T_{on}$
7.10 ANOVA of MRR (Copper electrode)
7.11 ANOVA of MRR (Graphite electrode)
7.12 Variation of MRR w. r. to $V_g$
7.13 Variation of MRR w. r. to $I_p$ 134
7.14 Variation of MRR w. r. to $T_{on}$ 134
7.15 ANOVA of Electrode Wear Rate (Copper electrode) 136
7.16 ANOVA of Electrode Wear Rate (Graphite electrode) 136
7.17 Variation of EWR w. r. to $V_g$ 136
7.18 Variation of EWR w. r. to $I_p$ 136
7.19 Variation of EWR w. r. to $T_{on}$ 137

8.1 Central Composite Design used in the experiment 142
8.2 Different Variables Used in the Experiment and their Levels 142
8.3 Design Matrix and Responses of Carbonised Carbon-Carbon Composite 143
8.4 Design Matrix and Responses of Graphitised Carbon-Carbon Composite 144
8.5 ANOVA of Overcut for Carbonised Carbon-Carbon Composite 144
8.6 ANOVA of Overcut for Graphitised Carbon-Carbon Composite 144
8.7 Variation of OC w. r. to $V_g$ 145
8.8 Variation of OC w. r. to $I_p$ 145
8.9 Variation of OC w. r. to $T_{on}$ 145
8.10 ANOVA of MRR for Carbonised Carbon-Carbon Composite 147
8.11 ANOVA of MRR for Graphitised Carbon-Carbon Composite 147
8.12 Variation of MRR w. r. to $V_g$ 147
8.13 Variation of MRR w. r. to $I_p$ 147
8.14 Variation of MRR w. r. to $T_{on}$ 148
8.15 ANOVA of EWR for Carbonised Carbon-Carbon Composite 149
8.16 ANOVA of EWR for Graphitised Carbon-Carbon Composite 149
8.17 Variation of EWR w. r. to $V_g$ 149
8.18 Variation of EWR w. r. to $I_p$ 150
8.19 Variation of EWR w. r. to $T_{on}$ 150

9.1. Central Composite Design used in the experiments 156
9.2 Different Variables Used in the Experiments and their Levels 157
9.3 Design Matrix and Responses for Carbonised Carbon-Carbon Composite 157
9.4 Design Matrix and Responses for Graphite 158
9.5 Design Matrix and Responses of Graphitised Carbon-Carbon Composite

9.6 ANOVA of OC for Carbonised Carbon-Carbon Composite

9.7 ANOVA of OC for Graphite

9.8 ANOVA of OC for Graphitised Carbon-Carbon Composite

9.9 Variation of OC with respect to Gap Voltage ($V_g$)

9.10 Variation of OC with respect to sparking current ($I_p$)

9.11 Variation of OC with respect to Pulse-on Time ($T_{on}$)

9.12 ANOVA of MRR for Carbonised Carbon-Carbon Composite

9.13 ANOVA of MRR for Graphite

9.14 ANOVA of MRR for Graphitised Carbon-Carbon Composite

9.15 Variation of MRR with respect to $V_g$

9.16 Variation of MRR with respect to $I_p$

9.17 Variation of MRR with respect to $T_{on}$

9.18 ANOVA of EWR for Carbonised Carbon-Carbon Composite

9.19 ANOVA of EWR for Graphite

9.20 ANOVA of EWR for Graphitised Carbon-Carbon Composite

9.21 Variation of EWR with respect to $V_g$

9.22 Variation of EWR with respect to $I_p$

9.23 Variation of EWR with respect to $T_{on}$

10.1 Central Composite Design used in the experiment

10.2 Different Variables Used in the Experiment and their Levels

10.3 Design Matrix and Responses of Graphitised C-C Composite of density 1.77 g/mm$^3$ (Specimen 1)

10.4 Design Matrix and Responses of Graphitised C-C Composite of density 1.903 g/mm$^3$ (Specimen 2)

10.5 ANOVA of OC (specimen 1)

10.6 ANOVA of OC (specimen 2)

10.7 Variation of OC w. r. to $V_g$

10.8 Variation of OC w. r. to $I_p$

10.9 Variation of OC w. r. to $T_{on}$

10.10 ANOVA of MRR (specimen 1)
10.11 ANOVA of MRR (specimen 2) 176
10.12 Variation of MRR w. r. to $V_g$ 176
10.13 Variation of MRR w. r. to $I_p$ 176
10.14 Variation of MRR w. r. to $T_{on}$ 177
10.15 ANOVA of EWR (specimen 1) 178
10.16 ANOVA of EWR (specimen 2) 178
10.17 Variation of EWR w. r. to $V_g$ 178
10.18 Variation of EWR w. r. to $I_p$ 179
10.19 Variation of EWR w. r. to $T_{on}$ 179