# Contents

1 Optimal Covariate Designs (OCDs): Scope of the Monograph       1
   1.1 Preamble: A Reflection on the Choice of Covariates        1
   1.2 Basic Set-Up and Optimality Conditions                    7
   1.3 Chapter-Wise Summary                                      8
   References                                                   10

2 OCDs in Completely Randomized Design Set-Up                   13
   2.1 Introduction                                              13
   2.2 Covariate Designs Under Regular Cases                    16
   2.3 Covariate Designs Under Non-regular Cases                18
     2.3.1 First Stage of Maximization.                          19
     2.3.2 Second Stage of Maximization.                         21
     2.3.3 Examples                                             24
   References                                                   26

3 OCDs in Randomized Block Design Set-Up                       27
   3.1 Introduction                                              27
   3.2 Construction of Optimum $W$-Matrices                     28
   3.3 Relationship Between OCDs and MOAs                        30
   3.4 Some Further Constructions of Optimum $W$-Matrices        31
   Appendix                                                     38
   References                                                   39

4 OCDs in Balanced Incomplete Block Design Set-Up             41
   4.1 Introduction                                              41
   4.2 BIBDs Through Bose’s Difference Technique                43
   4.3 BIBDs Through Projective Geometry                       50
     4.3.1 Partitioning of the Blocks                           50
     4.3.2 Optimum Covariate Designs                            53

xiii
8.2.2 Extended Mixed Orthogonal Array (EMOA) and Construction of OCDs .......................... 149
8.2.3 Examples of OCDs ........................................... 151
8.2.4 OCDs on Some General Set-Ups ............................. 159
8.3 OCDs in Split-Plot and Strip-Plot Design Set-Ups ................. 163
8.3.1 Preliminaries .................................................. 163
8.3.2 Optimum Covariate Designs ................................. 174
References ......................................................... 175

9 Applications of the Theory of OCDs ................................ 177
9.1 Introduction: Eye-Openers ....................................... 177
9.2 Other Application Areas .......................................... 189
References ......................................................... 216

Author Index .................................................... 217

Subject Index .................................................... 219
Optimal Covariate Designs
Theory and Applications
Das, P.; Dutta, G.; Mandal, N.K.; Sinha, B.K.
2015, XVII, 221 p., Hardcover
ISBN: 978-81-322-2460-0