Contents

Introduction.....7

1. Optimization Problems in Graphs.....11

1.1. Introduction to Graph Theory 11

1.2. Minimum Spanning Trees 20

1.3. Optimal Paths in Graphs 58

1.4 Maximal Flow in Networks.....94

1.5. Network Optimization using QM for Windows 133

2. Introduction to Complex Project Management.....151

2.1. Planning and Scheduling.....151

2.2. Activity, Precedence Relationships among Activities 152

2.3. Network Representation using the Critical Path Method.....153

2.4. Network Representation using the Metro Potential Method 160

2.5. Project Scheduling and Resources Allocation.....186

3. Linear Programming.....221

3.1. Introduction to Linear Programming.....221

3.2. Presentation Forms of (LPP)s 222

3.3. Feasible Solutions. Optimal Solutions. Geometric Properties of the Feasible Region.....227

3.4. The Graphical Solution Method.....230

3.5. Basic Solutions. The Simplex Method Fundamentals 284

3.6. Duality in Linear Programming 299

4. Transportation Problems 349

4.1. Mathematical Model and Basic Concepts 349

4.2. Determination of a Starting Basic Feasible Solution to the Transportation Problem 354

4.3. Determination of an Optimal Solution to the Transportation Problem 364

4.4. Degeneracy in Transportation Problems 419

4.5. Special Cases 442

References 469

List of Figures 473

List of Tables 487