

Introduction	
Basic Properties of a Superconductor	p. 1
Occurrence of a Superconductor	p. 8
Theoretical Background	p. 10
Elements of Kinetic Theory	p. 14
Superconducting Transitions	
Three Phase Transitions	p. 19
Pairons Move as Massless Particles	p. 21
The Bose-Einstein Condensation	p. 23
Bloch Electrons	
Bloch Theorem	p. 27
Fermi Liquid Model	p. 30
The Fermi Surface	p. 32
Heat Capacity; The Density of States	p. 37
Equations of Motion for a Bloch Electron	p. 39
Phonon Exchange Attraction	
Phonons and Lattice Dynamics	p. 45
Electron-Phonon Interaction	p. 49
Phonon-Exchange Attraction	p. 54
Quantum Statistical Theory	
Theory of Superconductivity	p. 59
The Bardeen-Cooper-Schrieffer Theory	p. 61
Remarks	p. 63
Cooper Pairs (Pairons)	
The Cooper Problem	p. 65
Moving Pairons	p. 67
Energy-Eigenvalue Problem for a Quasiparticle	p. 70
Derivation of the Cooper Equation	p. 73
Superconductors at 0 K	
The Generalized BCS Hamiltonian	p. 77
The Ground-State	p. 82
Discussion	p. 88
Quantum Statistics of Composites	
Ehrenfest-Oppenheimer-Bethe's Rule	p. 95
Two-Particle Composites	p. 96
Discussion	p. 102
Bose-Einstein Condensation	
Free Massless Bosons Moving in 2D	p. 107
Free Massless Bosons in 3D	p. 111
B-E Condensation of the Pairons	p. 114

Discussion	p. 115
The Energy Gap Equations	
Introduction	p. 123
Energies of Quasi-electrons at 0 K	p. 124
Energy Gap Equations at 0 K	p. 126
Temperature-Dependent Gap Equations	p. 128
Discussion	p. 130
Pairon Energy Gaps and Heat Capacity	
The Full Hamiltonian	p. 133
Pairons Energy Gaps	p. 135
Density of Condensed Pairons	p. 138
Heat Capacity	p. 141
Discussion	p. 143
Quantum Tunneling	
Introduction	p. 147
Quantum Tunneling in S-I-S Systems	p. 148
Quantum Tunneling in S ₁ -I-S ₂	p. 156
Discussion	p. 161
Flux Quantization	
Ring Supercurrent	p. 163
Phase of a Quasi-Wavefunction	p. 167
London's Equation. Penetration Depth	p. 170
Quasi-Wavefunction and its Evolution	p. 175
Discussion	p. 177
Ginzburg-Landau Theory	
Introduction	p. 181
Derivation of the G-L Equation	p. 183
Condensation Energy	p. 185
Penetration Depth	p. 189
Josephson Effects	
Josephson Effects and Supercurrent Interference	p. 193
Equations Governing a Josephson Current	p. 197
ac Josephson Effect and Shapiro Steps	p. 200
Discussion	p. 204
Compound Superconductors	
Introduction	p. 207
Type II Superconductors	p. 208
Optical Phonons	p. 213
Discussion	p. 216
Lattice Structures of Cuprates	

Introduction	p. 217
Layered Structures and 2-D Conduction	p. 217
Selected Cuprate Superconductors	p. 221
High-T _c Superconductors Below T _c	
The Hamiltonian	p. 227
The Ground State	p. 231
High Critical Temperature	p. 233
The Heat Capacity	p. 235
Two Energy Gaps; Quantum Tunneling	p. 236
Doping Dependence of T _c	
Introduction	p. 241
Critical Temperature T _c	p. 242
Doping Dependence of T _c	p. 245
Transport Properties Above T _c	
Introduction	p. 249
Simple Kinetic Theory	p. 250
Data Analysis	p. 255
Discussion	p. 257
Out-of-Plane Transport	
Introduction	p. 259
Theory	p. 260
Data Analysis	p. 265
Discussion	p. 266
Seebeck Coefficient (Thermopower)	
Introduction	p. 269
Theory	p. 272
Discussion	p. 275
Seebeck Coefficients in Metals	
In-Plane Seebeck Coefficient S _{ab}	p. 279
Out-of-Plane Seebeck Coefficient S _c	p. 280
Discussion	p. 283
Magnetic Susceptibility	
Introduction	p. 285
Theory	p. 287
Discussion	p. 292
Infrared Hall Effect	
Introduction	p. 295
Theory and Experiments for Au	p. 298
Theory for YBa ₂ Cu ₃ O ₇	p. 302
Data Analysis and Discussion	p. 303

d-Wave Cooper Pairs	
Introduction	p. 307
Phonon-Exchange Attraction	p. 307
d-Wave pairon Formation	p. 309
Discussion	p. 310
Connections with Other Theories	
Gorter-Cassimir's Two Fluid Model	p. 311
London-London's Theory	p. 312
Ginzburg-Landau Theory	p. 313
Electron-Phonon Interaction	p. 314
The Cooper Pair	p. 315
BCS Theory	p. 315
Bose-Einstein Condensation	p. 318
Josephson Theory	p. 319
High Temperature Superconductors	p. 320
Quantum Hall Effect	p. 321
Summary and Remarks	
Summary	p. 325
Remarks	p. 329
A Second Quantization	
References	p. 345
Bibliography	p. 355
Index	p. 359

Table of Contents provided by Blackwell's Book Services and R.R. Bowker. Used with permission.