



# Contents

Preface	5
Symbols and Definitions	9
<i>Chapter I</i> Statement of Boundary Value Problems in Mathematical Physics	12
1 Deriving Equations of Mathematical Physics	12
2 Classification of Second-order Equations	35
<i>Chapter II</i> Function Spaces and Integral Equations	41
3 Measurable Functions. The Lebesgue Integral	41
4 Function Spaces	48
5 Integral Equations	67
<i>Chapter III</i> Generalized Functions	88
6 Test and Generalized Functions	88
7 Differentiation of Generalized Functions	95
8 The Direct Product and Convolution of Generalized Functions	104
9 The Fourier Transform of Generalized Functions of Slow Growth	114
10 The Laplace Transform of Generalized Functions	121
11 Fundamental Solutions of Linear Differential Operators	125
<i>Chapter IV</i> The Cauchy Problem	134
12 The Cauchy Problem for Second-order Equations of Hyperbolic Type	134
13 The Cauchy Problem for the Heat Conduction Equation	157
14 The Cauchy Problem for Other Equations and Goursat's Problem	167
<i>Chapter V</i> Boundary Value Problems for Equations of Elliptic Type	180
15 The Sturm-Liouville Problem	181
16 Fourier's Method for Laplace's and Poisson's Equations	190
17 Green's Functions of the Dirichlet Problem	205
18 The Method of Potentials	211
19 Variational Methods	230
<i>Chapter VI</i> Mixed Problems	239
20 Fourier's Method	239
21 Other Methods	269

<i>Appendix</i> Examples of Solution Techniques for Some Typical Problems	277
A1 Method of Characteristics	277
A2 Fourier's Method	279
A3 Integral Equations with a Degenerate Kernel	281
A4 Variational Problems	283
References	284
Subject Index	287

