

# Contents

	Preface	vii
1.	Solvable Differential Equations	1
2.	Second-Order Differential Equations	8
3.	Preliminaries to Series Solutions	15
4.	Solution at an Ordinary Point	23
5.	Solution at a Singular Point	31
6.	Solution at a Singular Point (Cont'd.)	37
7.	Legendre Polynomials and Functions	47
8.	Chebyshev, Hermite and Laguerre Polynomials	57
9.	Bessel Functions	64
10.	Hypergeometric Functions	75
11.	Piecewise Continuous and Periodic Functions	83
12.	Orthogonal Functions and Polynomials	90
13.	Orthogonal Functions and Polynomials (Cont'd.)	95
14.	Boundary Value Problems	104
15.	Boundary Value Problems (Cont'd.)	109
16.	Green's Functions	119
17.	Regular Perturbations	129
18.	Singular Perturbations	138
19.	Sturm–Liouville Problems	145
20.	Eigenfunction Expansions	157
21.	Eigenfunction Expansions (Cont'd.)	163
22.	Convergence of the Fourier Series	171
23.	Convergence of the Fourier Series (Cont'd.)	176
24.	Fourier Series Solutions of Ordinary Differential Equations	187

<b>25.</b>	Partial Differential Equations	<b>194</b>
<b>26.</b>	First-Order Partial Differential Equations	<b>202</b>
<b>27.</b>	Solvable Partial Differential Equations	<b>210</b>
<b>28.</b>	The Canonical Forms	<b>219</b>
<b>29.</b>	The Method of Separation of Variables	<b>227</b>
<b>30.</b>	The One-Dimensional Heat Equation	<b>234</b>
<b>31.</b>	The One-Dimensional Heat Equation (Cont'd.)	<b>241</b>
<b>32.</b>	The One-Dimensional Wave Equation	<b>249</b>
<b>33.</b>	The One-Dimensional Wave Equation (Cont'd.)	<b>256</b>
<b>34.</b>	Laplace Equation in Two Dimensions	<b>266</b>
<b>35.</b>	Laplace Equation in Polar Coordinates	<b>275</b>
<b>36.</b>	Two-Dimensional Heat Equation	<b>284</b>
<b>37.</b>	Two-Dimensional Wave Equation	<b>292</b>
<b>38.</b>	Laplace Equation in Three Dimensions	<b>300</b>
<b>39.</b>	Laplace Equation in Three Dimensions (Cont'd.)	<b>306</b>
<b>40.</b>	Nonhomogeneous Equations	<b>316</b>
<b>41.</b>	Fourier Integral and Transforms	<b>323</b>
<b>42.</b>	Fourier Integral and Transforms (Cont'd.)	<b>330</b>
<b>43.</b>	Fourier Transform Method for Partial DEs	<b>338</b>
<b>44.</b>	Fourier Transform Method for Partial DEs (Cont'd.)	<b>344</b>
<b>45.</b>	Laplace Transforms	<b>354</b>
<b>46.</b>	Laplace Transforms (Cont'd.)	<b>361</b>
<b>47.</b>	Laplace Transform Method for Ordinary DEs	<b>374</b>
<b>48.</b>	Laplace Transform Method for Partial DEs	<b>384</b>
<b>49.</b>	Well-Posed Problems	<b>394</b>
<b>50.</b>	Verification of Solutions	<b>399</b>
	References for Further Reading	<b>405</b>
	Index	<b>407</b>