Contents

Preface to the Fourth Edition	1X
Chapter I Introduction, Vector Functions, and	
Electrostatics	1
Introduction	1
Vector Functions	2
Electrostatics	5
Problems	8
Chapter II Surface Integrals and the	
Divergence	11
Gauss' Law	11
The Unit Normal Vector	12
Definition of Surface Integrals	17
Evaluating Surface Integrals	21
Flux	31
Using Gauss' Law to Find the Field	33
The Divergence	37
The Divergence in Cylindrical and Spherical	
Coordinates	42
The Del Notation	44
The Divergence Theorem	45
Two Simple Applications of the Divergence	
Theorem	49
Problems	52
	SALAN STOLEN

Contents

Chapter III Line Integrals and the Curl	63
Work and Line Integrals	63
Line Integrals Involving Vector Functions	66
Path Independence	71
The Curl	75
The Curl in Cylindrical and Spherical Coordinates	82
The Meaning of the Curl	86
Differential Form of the Circulation Law	91
Stokes' Theorem	93
An Application of Stokes' Theorem	99
Stokes' Theorem and Simply Connected Regions	101
Path Independence and the Curl	103
Problems	104
Chapter IV The Gradient	115
Line Integrals and the Gradient	115
Finding the Electrostatic Field	121
Using Laplace's Equation	124
Directional Derivatives and the Gradient	131
Geometric Significance of the Gradient	137
The Gradient in Cylindrical and Spherical	
Coordinates	141
Problems	144
Solutions to Problems	156
Index	161