

## ***Contents***

Preface	v
---------	---

### *Lecture*

1. Relationship of the Heisenberg and Schrödinger Pictures	1
2. Basic Quantum Concepts: Hilbert-Space Case	8
3. Basic Quantum Concepts: General Case	12
4. The Fock Representation	16
5. Second Quantization: Bosons	20
6. Second Quantization: Fermions	25
7. A Model Hamiltonian	31
8. Value of the Classical Theory	41
9. The Scalar Field	43
10. The Scalar Field: Relativistic Invariance	49
11. The Electron Field	53
12. The Electron Field: Relativistic Invariance	59
13. Fields with Interaction: Relativistic Invariance	64

14.	Constraints	69
15.	The Electromagnetic Field without Charges	73
16.	Quantum Electrodynamics	79
17.	Solution of the Heisenberg Equations of Motion: General	86
18.	Solution of the Heisenberg Equations of Motion: Quantum Electrodynamics	89
19.	Normal Ordering	96
20.	The Energy Change	99
21.	Cutoffs	102
22.	Case of No Static Field	106
23.	Mass Renormalization	110
24.	The Anomalous Magnetic Moment	113
25.	The Lamb Shift: Preliminary	119
26.	The Lamb Shift: Vacuum-Polarization Term	120
27.	The Lamb Shift: Relativistic Term	126
28.	The Lamb Shift: Nonrelativistic Term	137
29.	The Lamb Shift: Total	142
30.	The Coulomb Force	143
31.	The General Physical Interpretation	147
32.	Relationship of the Present Field Theory to the Usual One	149