

Electrodynamics

Classical and Quantum

for MSc (Phys), BSc (Hons), BTech, GATE, NET/SET, UGC-CSIR

deals with the essentials of electrodynamics and incorporates the basic principles and mathematics involved in the subject. It is a self-contained book comprising 18 chapters and 9 appendices written in a cogent style to help the readers grasp the information quickly and easily. Figures, tables and appendices have been liberally added to explain the concepts lucidly.

The book is designed to fulfil the requirements of undergraduate and postgraduate students in the disciplines of physics, electrical and electronics engineering, electronics and communication engineering, and electronics and telecommunication engineering.

Salient Features of the Book

- The subject matter has been arranged in a systematic manner in accordance with the latest syllabi of various Indian and foreign universities.
- The language is simple and easily understandable.
- Each chapter with worked out problems and exercises.
- Glimpses in the form of important points given in each chapter provide an insight into the entire chapter.
- Each chapter contains a good number of short-answer and multiple choice questions which make the book useful for GATE, NET/SET, UGC-CSIR, and other entrance examinations.

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Preface

Electrodynamics is a complex subject and uses higher mathematics. Therefore, efforts have been made to write a student-friendly book which will help the students grasp the subject easily. This book is intended to serve as a textbook for BSc (Hons/Pass), MSc (Physics) and BTech students of various Indian as well as foreign universities.

This book comprises 18 chapters and 9 appendices. The mathematical background of this subject involves vector algebra, vector calculus, scalar and vector fields elaborated in Chapters 1 and 2. Chapter 3 explains the essentials of electrostatics and Chapter 4 deals with electrostatics in dielectrics. Chapter 5 covers the solution of boundary value problems in electrostatic fields. Since the electrostatic and magnetostatic fields are inter-related magnetostatics is covered in Chapter 6. Chapter 7 is devoted to the study of electromagnetic induction and Maxwell's equations. Electromagnetic waves are discussed in Chapter 8. Chapter 9 deals with scattering and dispersion of electromagnetic waves. Chapters 10–13 are devoted to the study of transmission lines, waveguides, electromagnetic radiation and radiating systems (antenna), and plasma physics respectively. Chapter 14 focuses on relativistic electrodynamics. Chapter 15 deals with interaction of charged particles with matter. Chapter 16 is devoted to the study of multipole radiations. Chapter 17 is devoted to the study of Hamiltonian formulation of field equations. Chapter 18 covers basics of quantum electrodynamics.

The subject matter has been tailored systematically from the fundamental concepts, keeping in mind the actual difficulties of the students. Efforts have been made to make the presentation lucid and comprehensive. The obscure and difficult points have been explained in a simple language and with necessary self-explanatory diagrams in a manner that the students may feel no difficulty in understanding the subject.

Each chapter contains a good number of worked out examples and exercises comprising short answer and multiple choice questions that appeared in GATE, NET/SET and UGC-CSIR and various other examinations. Glimpses in the form of important points given in each chapter provide an insight into the entire chapter.

This book is not just another addition to the books already available in the market, it offers a rich structural framework of principles, key equations, well labelled figures and typical worked out problems with a good number of multiple choice questions with answers.

We are thankful to CBS Publishers and Distributors, New Delhi. We would like to put on record the sincere efforts of Mr YN Arjuna, Senior Vice President Publishing, Editorial and Publicity, and his team comprising Ms Ritu Chawla, Ms Sanjubala Tripathy, Mr Manish Raj and Mr Pramod Kumar, for bringing out the book in the present form.

We welcome comments, suggestions and corrections from the readers.

SL Kakani
Shubhra Kakani

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