Introduction to Power Electronics

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Topics:
1. General Background
2. Power Devices
3. Power Converters

Grading: (3 學分)
1. Exam.: 60% ~ 80%
2. Hws, Projects Reports, and Presentations: 20% ~ 40%

Contents:

Chapter 1 Introduction
1.1 Introduction
1.2 Applications of Power Electronics
1.3 Types of Power Converters
1.4 Definitions and Basic Principles
1.5 Fourier Analysis
1.6 Power Factor
1.7 Thermal Analysis and Design of Power Devices

Appendix: Applications of Power Electronics

Chapter 2 Semiconductor Physics
2.1 The Conductivity of Materials
2.2 SEMICONDUCTOR MATERIALS
2.3 P-N JUNCTION
2.4 POWER DIODES
2.5 Schottky Diodes
2.6 Diode Rectifier Circuits
2.7 Thyristors- Silicon Controlled Rectifiers (SCRs)

Chapter 3 Power Bipolar- Junction-Transistors
3-1 Bipolar Junction Transistors (BJTs)
3-2 Base Drive Circuits for BJTs

Chapter 4 Power MOSFETs and IGBTs
4-1 Field Effect Transistors
4-2 Insulated Gate Bipolar Transistors (IGBTs)
4-3 Gate drive Circuits for MOSFETs and IGBTs

Chapter 5 Snubber Circuits (緩震電路)
5-1 Introduction
5-2 Switching Behaviors of BJTs
5-3 Snubber Circuits

Chapter 6 Power Converters
6-1 Introduction
6-2 Buck Converter (Step-down Converter)
6-3 Step-up (Boost) Converter
6-4 Buck / Boost Converter (Step up / down Converter)
6-5 Cuk dc-dc Converter
6-6 Full–Bridge dc–dc Converter