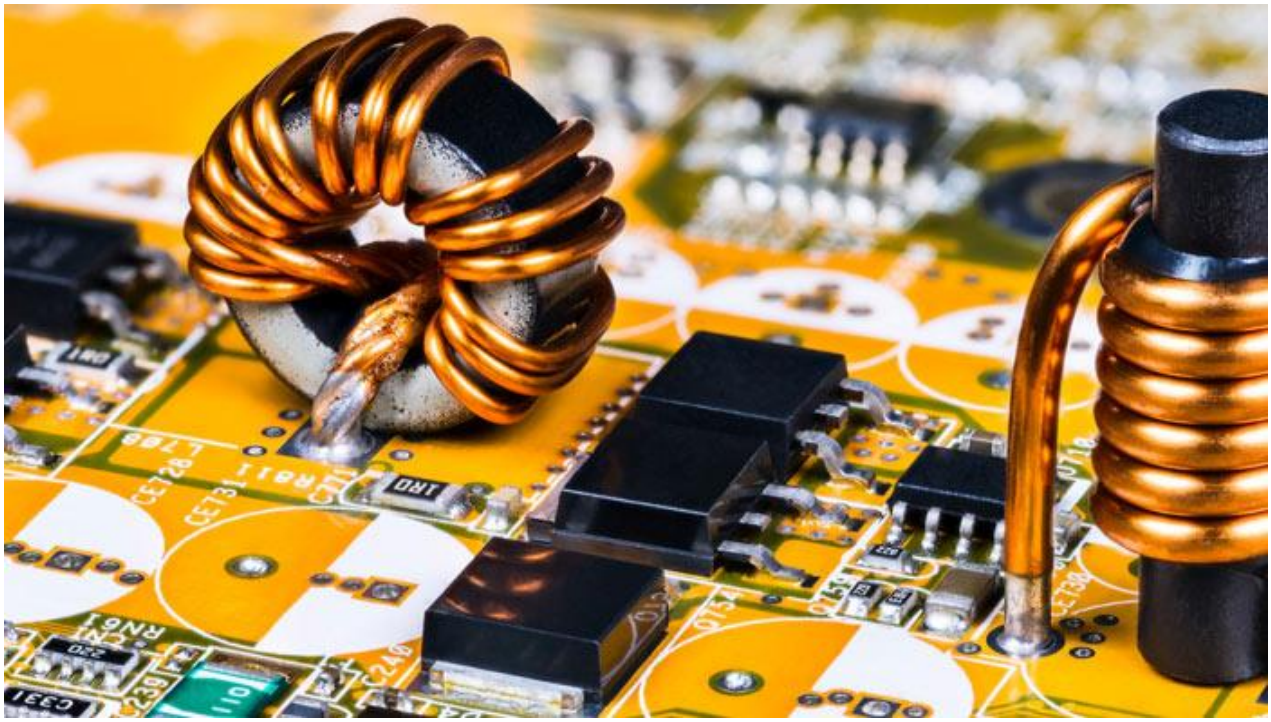
POWER ELECTRONICS

(EE3591, V SEMESTER – ELECTRICAL AND ELECTRONICS ENGINEERING,

As per Anna University 2021 Regulation)



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Dedicated to

The God Almighty and

Our Family Members.

Preface

This book Power Electronics is a core subject for 5th semester Electrical and Electronics Engineering Department of Anna University affiliated colleges under 2021 regulation and it is an essential subject for all Universities syllabus. This covers various converters, Switching devices and its characteristics both static, dynamic, converter operation under various loads, Applications of various types of switches, rectifiers, voltage regulators and inverters.

This book consists of 5 units described below shortly.

Unit 1; This unit (Chapter 2)covers MOSFET dynamic behavior - driver and snubber circuits - low power high switching frequency switching Power supplies, buck, boost, buck-boost converters – Isolated topologies – resonant converters - switching loss calculations and thermal design.

Unit 2; This unit (Chapter 3)coversIGBT: Static and dynamic behavior - single phase half bridge and full bridge inverters - VSI :(1phase and three phase inverters square wave operation) - Voltage control of inverters single, multi pulse, sinusoidal, space vector modulation techniques– various harmonic elimination techniques-CSI.

Unit 3; This unit (Chapter 4)coversPower Diode – half wave rectifier – mid-point secondary transformer based full wave rectifier – bridge rectifier – voltage doubler circuit – distortion factor – capacitor filter for low power rectifiers – LC filters – Concern for power quality – three phase diode bridge.

Unit 4; This unit (Chapter 5) covers SCR-Two transistor analogy-based turn- ON – turn ON losses – thermal protection – controlled converters (1 pulse, 2 pulse, 3 pulse, 6 pulse) - displacement factor – ripple and harmonic factor - power factor mitigation, performance parameters – effect of source inductance - inverter angle limit.

Unit 5; This unit (Chapter 6) coversTRIAC triggering concept with positive and negative gate pulse triggering, TRIAC based phase controllers - various configurations for SCR based single and three phase controllers.

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We also thank our Chairman **Mr. T.Ganesan**, Secretary **Er.G.Rajasekaran**, Principal **Dr.G.Balakrishnan**, Head of the Department and colleagues of IndraGanesan College of Engineering, Manikandam, Trichy.

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We would like to express our heartfelt thanks to Dr. G. Manickavasagam, Editor-in-Chief, Z Alpha Research and Publishing Hub, Trichy-4 for his sincere contribution in completion of this book.

Last but least, we like to thank our family members and beloved friends for rendering their support to complete this book in successful manner.

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CHAPTER – I
INTRODUCTION TO POWER ELECTRONICS

CHAPTER – II
SWITCHING POWER SUPPLIES

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INVERTERS

CHAPTER – IV
UNCONTROLLED RECTIFIERS

CHAPTER – V
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CHAPTER VI
AC PHASE CONTROLLERS