

University of Sistan and Balouchestan

Department of Electrical & Computer Engineering

Instructor: S. Masoud Barakati

E-mail: smbaraka@gmail.com, smbaraka@ece.usb.ac.ir

Tel: 54-31136548

COURSE OUTLINE

1. Introduction to power electronics:

- Evolution and scope
- Potential applications
- Generic Power Converter Topologies (Part 2)

2. Waveform Quality:

- Harmonic distortion and EMI caused by power converters
- Waveform quality indices: Distortion Factor (DF), Total Harmonic Distortion (THD), Form Factor (FF), Crest Factor (CF), Power Factor (PF)
- Input and output filter design

3. Computer simulation of power electronic circuits and power semiconductor devices:

- Introduction to PSIM, a circuit-oriented simulator for simulation of power electronic circuits.
- Switching characteristics of Diode, Thyristor, and Controllable switches (BJT, MOSFET, GTO, IGBT, and MCT).
- Switch power losses

4. Line frequency Diode rectifiers

Single Phase Diode Rectifiers

Three Phase Diode Rectifiers

5. Single Phase Controlled Converters

Single Phase Thyristor Converters: Structures and Technical Issues

6. Three-Phase Thyristor Converters

Three-Phase Converters: Structures and Technical Issues

7. Switch-Mode DC-to-DC Converters

DC-to-DC converters: Structures and Technical Issues

8. Switch-Mode DC-to-AC Converters (Inverters)

DC-to-AC converters: Structures and Technical Issues

9. Three-Phase Switch-Mode DC-to-AC Converters (Inverters)

Three-Phase DC-to-AC converters: Structures and Technical Issues

10. SVM (Space Vector Modulation method)

12. Resonant Converter (if we have time)

12. Multilevel convertres (if we have time)

Textbook:

• *Mohan, Undeland, and Robbins, Power Electronics: Converters, Applications, and Design, 2nd or 3rd Edition, John Wiley & Sons, Inc., 1995 or 2003.*

• *Lecture notes.*

• *Journal papers.*

Website

Vu.usb.ac.ir, under Faculty of Electrical and computer, Power Electronics 1

User: PE,

Pass:.....

GRADING SCHEME

Midterm 25%

Homework and Project 25%

Final Exam 50%