Cairo University
Faculty of Engineering
Systems and Biomedical Engineering
SBE 202
Electronic Devices and Circuits

I. Text Books:

1. **Microelectronic Circuits; 5th Edition;**
   Oxford University Press
   Adel S. Sedra & Kenneth C. Smith (Sedra)
   (1st Term) Ch 1, and Part I = Ch 3(not in Exam), 4, 5, & 6
   (2nd Term) Ch 10 & 11 (Partial).

2. **Digital Systems, Principles and Applications; 10th Edition;**
   Prentice Hall
   Ronald J. Tocci, & Neal S. Widmer (Tocci)
   (2nd Term) Ch 3(P), 4(P), 5, 6, 7, 8(P), 9, 10, 12, 13 (P)

3. **Digital Design; 3d Edition;**
   M. Moris Mano (P)
   (2nd Term)

II. Grading (approximate, tentative):

First Term:

75 Final 35 Midterms 25 Lab 15 Quizes, Reports, Participation … etc

Dates: Midterms at the end of chapters 4, 5, and 6.

There will be unplanned, in-lecture, quizzes.

Hints:

Items in red are not for exam.
Items in gray have been studied before.
Items in blue are conditional, i.e. if time permits.

III. Contents Summary

1St Term: Sedra

Ch 1: Introduction: Signals and Amplifiers.
Ch 2: Operational Amplifiers.
Ch 3: Semiconductors.
Ch 4: Diodes.
Ch 6: Bipolar Junction Transistors (BJT).
Ch 5: Field Effect Transistors (MOSFETs).

2nd Term:

IC Families: Mano Ch 10 (Partial): Digital Integrated Circuits (TTL)
Sedra Ch 10: Digital CMOS Logic Circuits.
Sedra Ch 11: Memory, ECL, and BICMOS.

Tocci : Revision
Ch 3: NAND_NOR.
Ch 4: K_Map.
Ch 5: FFs & One Shot
Ch 6: Arithmetic Logic Unit
Ch 7: Counters & Registers.
Ch 9 : MSI Logic Circuits: Decoders, Encoders, Multiplexers, & Demultiplixers.
Ch 10: Digital System Projects Using HDL.
Ch 12: Memory Devices.
Ch 13: Programmable logic Device Architectures.

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SBE 202II
Electronic Devices and Circuits
Analogue Electronics
Overview

IV. Content Details

Microelectronic Circuits

Ch 1: Signals and Systems

Introduction
1.1 Signals
1.2 Frequency Spectrum of Signals
1.3 Analog and Digital Signals
1.4 Amplifiers
1.5 Circuit Models for Amplifiers
1.6 Frequency Response of Amplifiers

Qs: 22 23 39 40 41 42 46 47 52 54 57 60 63 67 69 74 77 79 81 82 88

Ch 2: Operational Amplifiers

Ch 3: Semiconductors

Ch 4: Diodes

Introduction
4.1 The Ideal Diode
4.2 Terminal Characteristics of Junction Diodes
4.3 Modeling of the Diode Forward Characteristics
4.4 Operation in the Reverse Breakdown Region - Zener Diodes
4.5 Rectifier Circuits
4.6 Limiting and Clamping Circuits
4.7 Special Diodes
Qs: 2 3 9 10 13 15 20 23 26 30 31 32 33 34 37 43 48 49 57 60 63 69 71 74 78 79 80 81 82 86 87 88 90 91 93 94 97 99 102 105

Sedra Ch 6: Bipolar Junction Transistors (BJT)

Introduction

6.1 Device Structure and Physical Operation

6.2 Current Voltage Characteristics.

6.3 The BJT Circuit at DC.

6.4 Applying the BJT in Amplifier Design.

6.5 Small-Signal Operation and Models

6.6 Basic BJT Amplifier Configurations.

6.7 Biasing in BJT Amplifier Circuits.

6.8 Discrete-Circuits BJT Amplifiers

Qs: 8 20 21 24 29 38 42 44 56 57 58 64 65 66 68 69 73 79 80 81 83 85 87 90 92 94 96 99 100 106 109 115 116 120 123 130 134 135 137 141 143 147 148 151 155 159 161 166 167 170 171

Ch 5: MOS Field Effect Transistors (MOSFET)

Introduction

5.1 Device Structure and Physical Operation

5.2 Current-Voltage Characteristics

5.3 MOSFET Circuit at DC

5.4 Applying the MOSFET Amplifier Design

5.5 Small Signal Operations and Models

5.6 Basic MOS Amplifier Configurations

5.7 Biasing the MOSFET Amplifier Circuits

5.8 Discrete-Circuit MOS Amplifiers.

5.9 The Body-Effect and Other Topics

Qs: 4 13 15 17 21 26 32 35 37 40 42 45 52 53 54 57 61 62 65 69 71 75 77 80 85 87 91 95 98 99 100 110 114 116 120 121 123