

University of Management and Technology

Course Outline

Course code.....EE 208..... Course title.....Electronic Devices & Circuits.....

Program	BSEE
Credit Hours	3
Duration	One semester
Prerequisites	EE-111 Circuit Analysis
Resource Person	Jameel Ahmad, Muhammad Asim Butt, Waseem Iqbal
Counseling Timing	See office window
Contact	Jameel.ahmad@umt.edu.pk, asim.butt@umt.edu.pk and waseem.iqbal @umt.edu.pk

Chairman/Director signature.....

Dean's signature..... Date.....

Learning Objective:

Upon Completion of the course, the students will be able to:-

1. Understand distinguishing characteristics of BJTs, MOSFETS and CMOS
2. Understand basic electronic devices e.g., diode, transistor construction and characteristics
3. DC biasing of transistors
4. DC biasing of FETs
5. solve simple circuits using diodes, transistors , MOSFETS & CMOS
6. load line analysis of diode, transistors and MOSFETS
7. solving problems related to amplification using transistors and MOSFETS.
8. working of a transistor and MOSFET as a switch for digital circuits
9. Able to design electronic circuits to meet given specs

Learning Methodology:

Lecture, interactive, participative

Grade Evaluation Criteria

Following is the criteria for the distribution of marks to evaluate final grade in a semester.

Marks Evaluation	Marks in percentage
Quizzes and Assignments	20
Mid Term	30
Final exam	50
Total	100

Recommended Text Books:

Text book: Fundamentals of Microelectronics by Behzad Razavi, second edition

Reference Books:

- 1) Microelectronics Circuits by Sedra/Smith. seventh edition

Calendar of Course contents to be covered during semester

Week	Course Contents	Textbook (topics)
1	Introduction to electronic devices and circuits, basic physics of semiconductors	TB : 1.1-1.4 2.1-2.2
2	DIODE MODELS AND CIRCUITS Ideal Diode, <i>pn</i> Junction as a Diode, Large-Signal and Small-Signal Operation	TB: 3.1-3.4
3	APPLICATIONS OF DIODES Half-Wave and Full-Wave Rectifiers, Voltage Regulation, Limiting Circuits, Voltage Doublers, Diodes as Level Shifters and Switches	TB: 3.5.1 - 3.5.2
4	APPLICATIONS OF DIODES Limiting Circuits, Voltage Doublers, Diodes as Level Shifters and Switches	TB: 3.5.3 - 3.5.5
5	PHYSICS OF BIPOLAR TRANSISTORS Structure of Bipolar Transistor, Operation of Bipolar Transistor in Active Mode, Bipolar Transistor Models and Characteristics	TB: 4.2 - 4.4
6	PHYSICS OF BIPOLAR TRANSISTORS Operation of Bipolar Transistor in Saturation Mode, The PNP Transistor Structure and Operation	TB: 4.5-4.6
7	BIPOLAR AMPLIFIERS Input and Output Impedances, Biasing, DC and Small-Signal Analysis , Operating Point Analysis and Design.	TB: 5.1 - 5.2
8	Mid Term Examination	
9	BIPOLAR AMPLIFIERS Bipolar Amplifier Topologies, Common-Emitter Topology, Common-Base Topology, Emitter Follower	TB: 5.3

10	PHYSICS OF MOS TRANSISTORS Structure of MOSFET, Operation of MOSFET: Qualitative Analysis , Derivation of I-V Characteristics, Channel-Length Modulation	TB: 6.1 – 6.2.3
11	PHYSICS OF MOS TRANSISTORS Operation of MOSFET: MOS Transconductance, Velocity Saturation, Other Second-Order Effects, MOS Device Models	TB: 6.2.4 – 6.3
12	PHYSICS OF MOS TRANSISTORS PMOS Transistor, CMOS Technology, Comparison of Bipolar and MOS Devices	TB: 6.4 - 6.6
13	CMOS AMPLIFIERS General Considerations: MOS Amplifier Topologies, Biasing, Realization of Current Sources, Common-Source Stage, CS Core, CS Stage with Current-Source Load, CS Stage with Diode-Connected Load , CS Stage with Degeneration, CS Core with Biasing	TB: 7.1- 7.2
14	CMOS AMPLIFIERS Common-Gate Stage, CG Stage with Biasing, Source Follower, Source Follower Core, Source Follower with Biasing	TB: 7.3-7.5
15	OPERATIONAL AMPLIFIER AS A BLACK BOX General Considerations, Op-Amp-Based Circuits	TB: 8.1-8.2