

Contents

1. Basic Theory

- Electronic structure of solids
- Energy bands
- Fermi level
- Intrinsic and extrinsic semiconductors
- PN junctions
- Bipolar junction transistors (BJTs)
- Metal-semiconductor and MIS junctions

2. Fabrication of Silicon Devices and Circuits

- Photolithography
- Mask technology
- Diffusion processes
- Metallization
- Epitaxial growth
- Junction formation

3. Planar Devices and Integrated Circuits

- Planar diodes
- Planar transistors
- Silicon integrated circuits

4. Bipolar Logic Circuits

- Logic functions
- Logic gates
- TTL (Transistor-Transistor Logic)
- Schottky TTL
- Logic family characteristics

5. Differential Amplifiers

- Differential amplifier principles
- Integrated operational amplifiers

6. MOS Devices

- MOSFET operation

- Threshold voltage
- N-channel and P-channel MOS devices
- CMOS technology
- Silicon-on-Sapphire (SOS)
- Charge-Coupled Devices (CCD)

7. MOS Circuits

- CMOS inverters
- NAND and NOR gates
- MOS amplifiers
- Analog MOS applications

8. Thin-Film Circuits

- Thin-film deposition techniques
- Thin-film resistors and capacitors
- Thin-film transistors

9. Thick-Film Circuits

- Screen-printing technology
- Passive components
- Thick-film substrates and conductors

10. Hybrid Circuits

- Hybrid microelectronics
- Interconnection and packaging techniques

11. Microwave Microelectronic Applications

- Microstrip circuits
- Semiconductor microwave sources
- Schottky diodes
- Gallium arsenide (GaAs) devices

12. Semiconductor Memories

- ROM (Read-Only Memory)
- RAM (Random Access Memory)
- Non-volatile memories
- Shift registers

