Title: Electronic Devices and Circuits

Code Number: EE1201

Credit Hours: 4 (3+1)

Prerequisites: EE1103 Linear Circuit Analysis

Semester: 2nd

Course Objectives
The course will enable students to:
1. Describe and explain the basic construction, operation and characteristics of semiconductor devices
2. Apply the acquired knowledge to solve small scale circuits consisting of semiconductor devices
3. Illustrate dc and ac response of small signal amplifier circuits using device models
4. Construct circuits on breadboards, conduct experiments in laboratory and perform electrical measurements and interpret experimental data

Contents
Unit 1: Semiconductor Theory
 1. Introduction to Semiconductors.
 2. Intrinsic and Extrinsic Semiconductors.
 3. Doping and energy levels.
Unit 2: Diodes
1. PN junction/ Biased PN junction.
2. V-I Characteristics.
3. Load Line and dynamic resistance.
4. Diode models.
5. Reverse recovery time and temperature effects.
6. Diode Equivalent Circuits Transitions, Recovery, Specification, Notations
7. Testing of Diode
8. Zener Diode, Light Emitting Diodes
Unit 3: Diode Applications
1. Load Line Analysis.
2. Parallel and Series Configurations.
3. Zener Diodes.
4. Voltage-Multiplier Circuits
5. Half wave and Full wave rectifiers.
6. Clippers and Clampers.
7. Logic gates.
Unit 4: Bipolar Junction Transistors
1. Construction, Limits of Operation, Specification and characteristics.
2. Testing, Casing and Terminal Identification of BJTS
3. Amplifying action and variation in current gain.
4. Common Emitter, Common Collector and Common Base Configurations.
5. Power Ratings.
Unit 5: BJT Biasing Circuits
1. Fixed Bias, Voltage Divider Bias and Emitter feedback Bias Circuits

2. DC load line and operating point
3. Biasing circuit design and stabilization
4. Miscellaneous Configurations
5. Transistor as a switch

Unit 6: BJT Small Signal Analysis
1. AC Domain and BJT Modeling
2. Common Emitter Amplifier
3. Common Base Amplifier
4. Common Collector Amplifier
5. Amplifier Design and Loading effects
6. Two Port Systems and Cascaded Systems
7. Darlington and Feedback Pair
8. Hybrid Equivalent Model and Hybrid π Model

Unit 7: Field Effect Transistors
1. JFET Construction and Operation
2. Transfer characteristics and parameters

Unit 8: FET Biasing Circuits
1. Fixed Bias, Self-Bias and Voltage divider Bias
2. Design of a bias circuit

Unit 9: FET Small Signal Analysis
1. JFET/Depletion MOSFET small-signal model
2. Common source, common drain and common gate amplifiers
3. Loading effects and design of amplifier circuits

Lab Work Outline

Design and implement circuits using diodes, transistors, and operational amplifiers, and verify their behavior using lab instruments. Verify the functionality of electronic devices through practical applications of circuit theorems. Analyze and design amplifier circuits using operational amplifiers and validate their performance through laboratory experiments.

Teaching-Learning Strategies:

The pedagogical approach to this course relies on face-to-face teaching in a university classroom environment. The lectures are delivered using multimedia support and on white board. Students are engaged and encouraged to solve real world problems using computer-aided tools.

Assignments/Types and Number with calendar:

A minimum of four assignments to be submitted before the written exams for each term.

Assessment and Examinations:

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2.	Sessional Assessment	25%	It is continuous assessment. It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Recommended Books:
1. Electronic Devices and Circuits by Theodore F. Bogart, Jr.
2. Electronic Devices and Circuit Theory, H. Boylestad and L. Nashelsky, ISBN- 10: 0135026490
3. Electronic Devices, Thomas L. Floyd, ISBN-10: 0132359235