Electronic Devices and Circuits

Code	Credit Hours
EE-215	3-1

Course Description

The course is designed to acquaint students with physical operation and terminal characteristics of diodes, modeling of forward and reverse characteristics of diodes, zener diodes, rectifiers and limiting circuits. Physical structure and principle of operation of BJTs and MOSFETs. Analysis of dc circuits and biasing of transistors, small/large signal models of BJTs and MOSFETs. Small signal model, design and analysis of various amplifier configurations.

Text Book:

1. Microelectronic Circuits, by Adel S. Sedra and Kenneth C. Smith, Oxford University Press.

Reference Book:

1. Fundamentals of Microelectronics, by B. Razavi, Wiley.

Prerequisites

EE-111 Linear Circuit Analysis

ASSESSMENT SYSTEM FOR THEORY

Quizzes	10%
Assignments	10%
Mid Semester Exam	30%
ESE	50%

ASSESSMENT SYSTEM FOR LAB

Project	10%
Lab Work and Report	70-80%
Lab ESE/Viva	20-30%

Teaching Plan

Week No	Topics	Learning Outcomes
1-4	Diodes	The Ideal Diode. Terminal Characteristics of PN Junction Diodes. Modeling the Diode Forward Characteristic. Operation in the Reverse Breakdown Region (Zener Diodes). Rectifier Circuits. Limiter Circuits.
5-8 10-11	BJTs	Device Structure and Physical Operation. Current-Voltage Characteristics. BJT Circuits at DC. Applying the BJT in Amplifier Design. Small-Signal Operation and Models. Basic BJT Amplifier Configurations and Discrete-Circuit BJT Amplifiers.
9	**MID Semester Exam**	
12-17	MOSFETs	Device Structure and Physical Operation. Current Voltage Characteristics. MOSFET Circuits at DC. Applying the MOSFETs in Amplifier Design. Small-Signal Operation and Models. Basic MOSFET Amplifier Configurations. Biasing in MOS Amplifier Circuits and Discrete-Circuit MOS Amplifiers.
18	**End Semester Exam**	

Practical:

Experiment No	Description
1	Introduction: Basic Concepts and Lab Equipment
2	Diode Characteristics
3	Construction of a Half Wave Rectifier Circuit and Checking its Output Waveform on Oscilloscope
4	Construction of a Full Wave Rectifier Circuit and Checking its Output Waveform on Oscilloscope
5	To Check the Effects of Filter Capacitance on DC Output Voltage and Ripples on Oscilloscope
6	Study of Diode Clippers (Application of Diodes)
7	Study of Diode Clampers (Application of Diodes)
8	Study of Zener Diode Characteristics and Voltage Regulator
9	Study of Characteristics of Bipolar Junction Transistor (BJT)

10	Fixed and Voltage Divider Bias of BJTs
11	Emitter and Collector Feedback Bias of BJT
12	Common Emitter Transistor Amplifier
13	Common Base and Emitter Follower(Common Collector) Amplifier
14	Common Source Amplifier