

# AMIT-06 ELECTRONICS CIRCUITS

## UNIT-1 SEMICONDUCTOR DIODES

- 1.1 Introduction, Semiconductor materials, covalent bond and intrinsic materials,
- 1.2 Energy levels, extrinsic materials:
- 1.3 p-type and n-type semiconductors, semiconductor diodes, ideal versus practical diodes,
- 1.4 Resistance levels, diode equivalent circuits, transition and diffusion capacitance,
- 1.5 Reverse recovery time, diode specification sheet, zener diode, Light Emitting diode,
- 1.6 Tunnel diode, schottky diode, varicap diode

## UNIT-2 DIODE CIRCUITS INTRODUCTION

- 2.1 Load –line Analysis, Series Diode configuration,
- 2.2 Parallel and series-parallel configurations,
- 2.3 Typical diode circuits, Half-wave & Full wave rectifier, Clippers, Clampers,
- 2.4 Zener Diode as voltage regulators, Voltage multiplier circuits,
- 2.5 Practical Applications of diode circuits

## UNIT-3 BIPOLAR JUNCTION TRANSISTOR

- 3.1 Transistor construction, Operation, Common-base configuration & characteristic,
- 3.2 Transistor Amplifying action, Common-Emitter configuration & characteristic,
- 3.3 Common collector configuration & characteristic,
- 3.4 Limits of operation, study of Transistor data sheet

## UNIT-4 DC-BIASING OF BIPOLAR JUNCTION TRANSISTORS

- 4.1 Operating point, Fixed biased configuration, Emitter-bias configuration,
- 4.2 Voltage divider bias configuration, collector feedback configuration,
- 4.3 Emitter follower configuration, Miscellaneous configuration,
- 4.4 Design operations, current mirror circuits, current source circuits, PNP transistors,
- 4.5 Transistor switching networks, bias stabilization of transistors, Practical applications

## UNIT-5 AC ANALYSIS OF BIPOLAR JUNCTION TRANSISTORS

- 5.1 Application in AC domain, BJT Transistor modeling,
- 5.2 Re Transistor model of Common-Emitter fixed bias configuration, voltage divider bias,
- 5.3 CE emitter-bias, Emitter follower,
- 5.4 Common-base, Collector feedback , Collector DC feedback configuration,
- 5.5 Current gain, effect of RL and RS Two port System Approach, cascaded systems,
- 5.6 Darlington connection, Feedback pair, Hybrid equivalent model,
- 5.7 Approximate hybrid equivalent circuits, Hybrid  $\pi$  model, Practical Applications.

## UNIT-6 MOS FIELD-EFFECT TRANSISTORS

- 6.1 Device Structure and Physical Operation, Current-Voltage Characteristics,
- 6.2 MOSFET Circuits at DC, The MOSFET as an Amplifier and as a Switch,
- 6.3 Biasing in MOS Amplifier Circuits, Small Signal Operation and Models,

6.4 Single-Stage MOS Amplifiers,

6.5 The Depletion-Type MOSFET, JFET -construction, operation and characteristics

### **UNIT-7 FREQUENCY ANALYSIS OF BJT AND FET**

7.1 Decibels, general frequency consideration, Normalized Process,

7.2 Low Frequency analysis of BJT and FET, Miller effect capacitance,

7.3 High frequency response of BJT and FET, Square wave testing

### **UNIT-8 POWER AMPLIFIERS**

8.1 Introduction, series –fed Class A amplifier,

8.2 Transformer-Coupled Class A amplifier,

8.3 Class B amplifier operation, Class B amplifier circuits,

8.4 Amplifier distortion, Class C and Class D amplifier,

8.5 Heat sink and its operation

### **Reference Books:**

1. Sedra, Smith, 'Microelectronic Circuits', Oxford University Press, fifth edition, 2004.
2. Paul Horowitz and Winfield Hill, 'The art of electronics', Cambridge university press, third edition, 2011.

