

(BM-209) - Basic Electronics

Course Outline:

Theory:

1. **Semiconductor Theory**
 1. Introduction,
 2. Intrinsic and Extrinsic Semiconductors,
 3. Doping and energy levels.
2. **Diodes**
 1. PN junction/ Biased PN junction,
 2. V-I Characteristics,
 3. Load Line and dynamic resistance.
 4. Diode models, Reverse recovery time and temperature effects,
3. **Diode Applications**
 1. Half wave and Full wave rectifiers,
 2. Clippers and Clampers, Logic gates.
4. **Bipolar Junction Transistors**
 1. Construction, operation and characteristics,
 2. Amplifying action and variation in current gain,
 3. Common Emitter, Common Collector and Common Base Configurations. Power Ratings.
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, Transistor as a switch
6. **BJT Small Signal Analysis**
 1. Common Emitter Amplifier, Common Base Amplifier, Common Collector Amplifier, Amplifier Design and Loading effects,
7. **Field Effect Transistors**
 1. JFET Construction and Operation,
 2. Transfer characteristics and parameters,
 3. FET Biasing Circuits, Fixed Bias,
 4. Self-Bias and Voltage divider Bias
8. **Design of a bias circuit**
 1. FET Small Signal Analysis,
 2. JFET/Depletion MOSFET small-signal model,
 3. Common source, common drain and common gate amplifiers,
 4. Loading effects and design of amplifier circuits.
9. **Differential Amplifiers**
 1. Darlington transistor circuit, properties of differential amplifier stage,
 2. Circuits of differential amplifiers using BJTs and FETs.
10. **Oscillators:**
 1. Hartley oscillators,
 2. Colpitt oscillators,
 3. RC phase shift oscillators,
 4. Wein-Bridge oscillators,
 5. Crystal oscillators based on BJT and FET.

List of Practicals:

1. To observe the working of diode with forward and reverse bias.
2. Plot the diode characteristic curve.
3. Calculate the bulk resistance of the diode and observe its effect in the diode approximations.
4. To observe the working of half wave rectifier.

5. To observe the working of full wave rectifier
6. To observe the working of Bridge wave rectifier.
7. To observe the working of Zener Diode
8. To analyze the working of Clamper Circuit.
9. To analyze the wrking of Clipper Circuit.
10. To determine the output voltage for half wave voltage doubler.
11. To determine the output voltage for full wave voltage doubler.
12. To determine the output voltage for Zener limiting circuit
13. Checking and Troubleshooting the NPN and PNP Transistor using Multimeter.
14. To use the transistor in switching mode.
15. Demonstrate the operation and determine the biasing parameter of Base Bias Circuit.
16. Demonstrate the operation and determine the biasing parameter of Voltage Divider Bias Circuit.

Suggested Teaching Methodology:

- Lecturing
- Written Assignments Report Writing

Suggested Assessment:

Theory (100%)

- Sessional (20%)
- Quiz (12%)
- Assignment (8%)
- Midterm (30%)
- Final Term (50%)

Laboratory (100%)

Text Book:

1. Electronic Devices and Circuit Theory By H. Boylestad and L. Nashelsky
 2. Electronic Devices and Circuits By Theodore F. Bogart, Jr.
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