

16BM204 ELECTRONICS ENGINEERING-I

Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	30	20	46	6	12	3	2

Course Description and Objectives:

This course offers fundamental concepts of semiconductor devices such as Junction Diode, Transistor, FET and other basic devices. The course objective is to enable the student to understand the concepts of semiconductor devices and circuits.

Course Outcomes:

The student will be able to:

- understand semiconductor devices through energy band diagrams.
- analyze characteristics of semiconductor junctions.
- differentiate between bipolar and unipolar conduction.
- understand physics of optical devices.
- understand the usefulness of semiconductor devices in circuit making.
- use these basic circuits to develop various useful applications.

SKILLS:

- ✓ Identify a Semiconductor Diode for a specific application and power handling capacity.
- ✓ Identify the transistor type for a given application (switch/amplifier).
- ✓ Recognize the required specifications of the transistor.
- ✓ Identify the amplification factor required.
- ✓ Test the working condition of the transistor.

UNIT - 1

L-9

PN JUNCTION DEVICES : PN junction diode, Structure, Operation and V-I characteristics, Diffusion and transient capacitance, Rectifiers, Half Wave and Full Wave Rectifier, Display devices, LED, Laser diodes, Zener diode characteristics, Zener Reverse characteristics, Zener as regulator.

UNIT - 2

L-9

TRANSISTORS : BJT, JFET, MOSFET, Structure, Operation, Characteristics and Biasing UJT, Thyristor and IGBT, Structure and characteristics.

UNIT - 3

L-9

AMPLIFIER : BJT small signal model, Analysis of CE, CB, CC amplifiers, Gain and frequency response, MOSFET small signal model, Analysis of CS and Source follower, Gain and frequency response High frequency analysis.

UNIT - 4

L-9

MULTISTAGE AMPLIFIERS AND DIFFERENTIAL AMPLIFIER : BIMOS cascade amplifier, Differential amplifier, Common mode and Difference mode analysis, FET input stages, Single tuned amplifiers, Gain and frequency response, Neutralization methods, Power amplifiers, Types (Qualitative analysis).

UNIT - 5

L-9

FEEDBACK AMPLIFIERS AND OSCILLATORS : Advantages of negative feedback, Voltage, Current, Series, Shunt feedback, Positive feedback, Condition for oscillations, Phase shift – Wien bridge, Hartley, Colpitts and Crystal oscillators.

ACTIVITIES:

- *Select a diode for a Cell- phone/ Laptop/ Tablet adapter/ for various rating.*
- *Design voltage regulator using Zener Diode.*
- *Design three types of biasing circuits and determine the stability factors in each case.*
- *Transistor as an amplifier for the given specifications.*
- *Design a wideband amplifier with FET.*

LABORATORY EXPERIMENTS

Outcomes:

students will be able to :

- assemble simple circuits to get basic circuits.
- understand the V-I characteristics of P-N junction diode and hence determine the diode forward, reverse currents, static and dynamic resistances.
- analyze the V-I characteristics of zener diode under reverse biased condition and observe the application as voltage regulator.
- calculate the efficiency and ripple factor of all rectifiers and analyze their performance with and without filter.
- understand the input and o/p characteristics of all BJT configurations in active region and determine its current amplification factors.
- understand the drain and transfer characteristics of FET and determine its amplification factor.
- understand the diode application as a clipper.

LIST OF EXPERIMENTS

Total hours-30

1. Characteristics of PN Junction Diode.
2. Zener diode Characteristics & Regulator using Zener diode.

3. Common Emitter input-output Characteristics.
4. Common Base input-output Characteristics.
5. FET Characteristics.
6. Common Emitter/Common source amplifier.
7. Cascade Amplifier.
8. Wien Bridge Oscillator using Transistors.
9. Class A Power Amplifier (Transformer less).
10. Class B Complementary Symmetry Amplifier.
11. Single Tuned Voltage Amplifier.
12. High Frequency Common base (BJT) / Common gate(JFET) Amplifier.

TEXT BOOKS:

1. David A. Bell ,”Electronic devices and circuits”, 2nd edition, Prentice Hall of India, 2004.
2. Sedra and smith, “Microelectronic circuits”, 2nd edition,Oxford University Press, 2004.

REFERENCE BOOKS:

1. Rashid, “Micro electronic circuits”, 1st edition,Thomson publications, 1999.
2. Floyd, “Electron devices”, 5th edition, Pearson Asia, 2001.
3. Donald A Neamen, “Electronic Circuit Analysis and Design”, 3rd Edition, Tata McGraw Hill, 2003.
4. Robert L.Boylestad, “Electronic devices and circuit theory”, 2002.
5. Robert B. Northrop, “Analysis and Application of Analog Electronic Circuits to Biomedical Instrumentation”, 1st Edition,CRC Press, 2004.