BASIC ELECTRONICS

Course Code: BECSE1C022

Course Title: Basic Electronics

Semester: II

Credits: 04 (03 Theory and 01 Lab)

Rationale

The goal of this course is to equip students with the knowledge of various types of semiconductors, transistors, amplifiers, and oscillators. Also, the course is intended to enhance their understanding about the various operation modes of these devices.

Course Outlines

Contents	**No. of Lectures**
Unit - I Introduction: Semiconductor Classification, Semiconductor bonds, Energy band description ,Semiconductor types, Hall effect. Diodes: P-N junction-I/V characteristics, diode equivalent circuits, semiconductor diodes, rectifiers-(efficiency, ripple factor),filters, clipers, clampers.	**10**
Unit - II Transistors: BJT construction, characteristics (cb,ce,cc), load line. BJT biasing. FET, JFET, MOSFET (Depletion and enhancement), FET biasing. Unit IV: Transistor Modeling: BJT small signal model, hybrid equivalent model,FET small signal model.	**10**
Unit -III Amplifiers: Single stage amplifiers, voltage gain, effect of frequency on Gain, multistage amplifier.	**10**
Unit - IV Other Semi-conductor devices: SCR'S , Diacs, triacs, and other thyristors, basic theory of operation, characteristics, Theory and operation of UJT.	**10**
Unit - V Oscillators: Feedback BH criteria, oscillator types, sinusoidal oscillator, Hartley oscillator, Collpitts Oscillator, Phase shift,Wein bridge oscillator, crystal oscillator.	**10**

Course Outcomes

At the end of the course, the student will be able to**:**

- To learn basic concepts of Semiconductor Devices
- Able to understand and use BJT and MOS Devices.
- Learn and able to apply small signal BJT and FET analysis.
- To analyze and design rectifiers and amplifiers.
- Able to understand advanced semiconductor devices and oscillators.

Text Books

1. Introduction Electronic Devices & Circuit Theory,11/e, 2012, Pearson:
2. Boylestad&Nashelsky
3. Electronic Principles, by Albert Paul Malvino Dr. and David J. Bates, 7/e.

Reference Books

1. Integrated Electronics by Millman, Halkias and Parikh, 2/e, McGrawHill.
2. ELECTRONICS Fundamentals and Applications by Chattopadhyay and Rakshit,15/e, New Age Publishers.
3. The Art of Electronics by Paul Horowitz, Winfield Hill, 2/e, Cambridge University.
4. Electronics - Circuits and Systems by Owen Bishop, 4/e, Elsevier.
5. Electronics Fundamentals: Circuits, Devices & Applications by Thomas L. Floyd & David M. Buchla, 8/e, Pearson Education.

Basic Electronics Laboratory

1. To know your laboratory: To identify and understand the use of different electronic and electrical instruments.
2. To identify and understand name and related terms of various electronics components used in electronic circuits.: Identify different terminals of components, fid their values and observe numbering associate with it.
3. Use of oscilloscope and function generator: Use of oscilloscope to measure voltage, frequency/time and Lissajous figures of displayed waveforms.
4. Study of half wave and Full-wave (Bridge) rectifier with and without capacitor filter circuit.
5. Realization of basic logic gates: Truth table verification of OR, AND, NOT, NOT and NAND logic gates from TTL ICs
6. Regulated power supply: study LM78XX and LM79XX voltage regulator ICs
7. Transistor as a Switch: study and perform transistor as a switch through NOT gate
8. Zenner diode as voltage regulator
9. To study clipping and Clamping circuits
10. To study different biasing cirtis.
11. Study of CE amplifier and observe its frequency response