Details of Course

Course Title	Course Structure			Pre-Requisite
Digital and Analog Electronics -B.Tech. EP III Sem Lesson Plan	**L**	**T**	**P**	
	3	**1**	**0**	

Course Objectives

This course aims to develop the basic understanding of analog circuits which are in line with the day today electronic systems and real time applications. 2. Further, the digital circuits which constitute the base for advanced systems are also covered in this paper. Thus, this course exposes students to understanding of i) various fundamental electronic devices, components and basic circuits. ii) varied digital circuitry and their operation

Course Outcomes (CO)

1. To define the basic concepts and characteristics of various semiconductor devices.
2. To analyze various rectifiers, amplifiers and configurations of analog circuits.
3. To recall basic concepts of boolean algebra, logic gates and logic families.
4. To classify and categorize different semiconductor memories and converters.
5. To analyze and design various combinational and sequential circuits and also implement the circuits using VHDL systems to solve real life problems.

S. No.	Content	Contact Hours
Unit 1	PN Junction Based Devices: Carrier Statistics in P N Junction-Barrier Potential and I-V Characteristics, Applications of P-N junctions- Diode as clipper, Diode as a clamper circuit, Diode as a switch, optoelectronic devices: light emitting diode, photodiode and phototransistor, solar cells. Zener Diode, Tunnel Diode	6
Unit 2	Bipolar Junction Transistor: The Junction transistor, Transistor construction, Transistor current components, Transistor as an amplifier, Input and Output characteristics of transistor in Common Base, Common Emitter, and Common collector configurations. α and β Parameters and the relation between them, BJT Specifications.	8
Unit 3	FETs and Digital Circuits: FETs: JFET, V-I characteristics, MOSFET, low frequency CS and CD amplifiers. Digital Circuits: Digital (binary) operations of a system, OR gate, AND gate, NOT, EXCLUSIVE OR gate, De Morgan Laws, NAND and NOR DTL gates, modified DTL gates, HTL and TTL gates, output stages, RTL and DCTL, CMOS, Comparison of logic families.	10
Unit 4	Combinational Logic Circuits: Basic Theorems and Properties of Boolean Algebra, Canonical and Standard Forms, Digital Logic Gates, The K-Map Method, Product-of-Sums Simplification, Don't-Care Conditions, NAND and NOR Implementation, Exclusive-OR Function, Binary Adder-Subtractor, Decimal Adder, Decoders, Encoders, Multiplexers.	8
Unit 5	Sequential Logic Circuits: Sequential Circuits, Storage Elements: Latches and flip flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Shift Registers, Ripple Counters, Synchronous Counters, Random-Access Memory, Read-	10

	Only Memory. Digital to analog converter: Binary Weighted Resistors, Analog to digital converter-Successive Approximation Method. Introduction to HDL.	
	Total	42

Books:

S. No.	Name of Books/Authors/Publisher
1.	Integrated Electronics: Analog and Digital Circuits and Systems, 2/e, Jaccob Millman, Christos Halkias and Chethan D. Parikh, Tata McGraw-Hill Education, India, 2010.
2.	Microelectronics Engineering – Sedra& Smith-Oxford.
3.	M. Morris Mano, Digital Design, 3rd Edition, Prentice Hall of India Pvt. Ltd.
4.	Digital Principles, 3/e, Roger L. Tokheim, Schaum's outline series.
5.	Floyd, Electronic Devices, Pearson Education.

LIST OF EXPERIMENTS: DIGITAL AND ANALOG ELECTRONICS LAB

1. To determine the P-N Junction Diode and Zener Diode Characteristics.
2. To analyse the output characteristics of diode clipping and clamping circuits.
3. To determine input and output characteristics of BJT in CB and CE Configuration.
4. To determine the output and transfer characteristics of JFET: measurement of gain, bandwidth and plot frequency response.
5. To determine the output and transfer characteristics of n-channel MOSFET: measurement of gain, bandwidth and plot frequency response.
6. To verify the truth tables of logic gates: AND, OR, NOR, NOT, NAND, XOR
7. To verify the truth table of Full Subtractor and Full Adder.
8. To study and verify the operation of 3 to 8 line decoder and 4 to 1 line multiplexer.
9. To verify the truth tables for R-S, D and J-K Flip-Flops.
10. To verify the operation of a shift register and decade counter.