ECE249:BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

L:3 T:0 P:0 Credits:3

Course Outcomes: Through this course students should be able to

CO1 :: Understand the workings of various semiconductor devices and analyze their applications.

CO2 :: Familiar to configure arduino board and sensor module for making application oriented project

CO3 :: Examine various number systems and their application in digital circuits.

CO4 :: Analyze combinational circuits with applications specific integrated circuits

CO5 :: Evaluate sequential circuits with flip-flops and ICs for various applications

CO6 :: Create skill-oriented projects with features and ergonomics.

Unit I

Fundamentals of Electrical Laws, Semiconductor Devices and its Applications : Ohm's Law, Kirchhoff's Law, Voltage division rule, Current division rule, Basics of semiconductors (Intrinsic and Extrinsic), PN junction diode (working and characteristics) and its applications (rectifiers and switch), Bipolar junction transistor (types, modes, construction, and working CE configuration)

Unit II

Introduction of Arduino and Sensors : Analog and digital signals, Arduino board (pin configuration and description), IR sensor., LDR, basic principle of ultrasonic sensor, Temperature sensor (DHT11/DHT22)

Unit III

Introduction to number system and logic gates : Number system (conversion), codes (B-G,G-B,Excess-3,BCD), Compliments, Binary Arithmetic (addition and subtraction using 2's complement), logic gates, boolean algebra, SOP and POS, K- Map (up to 4 variables)

Unit IV

Introduction to Combinational Logic Circuits : Combinational Logic Circuits: Adders, Subtractors, Multiplexers, De-multiplexers, Decoders, Encoders, Comparator upto 2 bit

Unit V

Introduction to Sequential Logic Circuits : Latch (SR and D), Flip-Flop (SR, JK, D and T), Master-Slave flip-flop, Conversion of basic flip-flop

Unit VI

Applications of Sequential Circuits : Registers: Operation of basic shift registers (SISO, SIPO, PISO, PIPO), Counters: Asynchronous counter (UP/DOWN/Mod-N), Synchronous counter (UP/DOWN/Mod-N), Ring counter and Johnson ring counter

Text Books:
1. DIGITAL LOGIC & COMPUTER DESIGN by M. MORRIS MANO, PEARSON

References:
1. ELECTRONIC CIRCUIT FUNDAMENTALS AND APPLICATIONS by MIKE TOOLEY, NEWNES PUBLISHERS

2. DIGITAL ELECTRONICS PRINCIPLES,DEVICES AND APPLICATIONS by ANIL K. MAINI, WILEY

3. FUNDAMENTALS OF ELECTRICAL ENGINEERING AND ELECTRONICS by B.L.THERAJA, S. CHAND & COMPANY