ECE249:BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

L:3 T:1 P:0 Credits:4

Course Outcomes: Through this course students should be able to

CO1 :: Learn to use basic circuit components and calculate related parameters for DC circuit.

CO2 :: Understand the working of various semiconductor devices and use them in various applications.

CO3 :: Understand and examine the structure of various number system and its application in digital circuit design.

CO4 :: Develop applications by programming an Arduino board to interface sensor modules.

CO5 :: Construct combinational circuit with application-specific integrated circuit and logic gates.

CO6 :: Develop sequential circuit with flip-flops, logic gates and IC's for various applications.

Unit I

Fundamentals of DC and AC circuits : resistance, inductance, capacitance, voltage, current, power and energy concepts, ohm's law, Kirchhoff's laws, voltage division rule, current division rule, dependent and independent sources, mesh and nodal analysis, Thevenin's theorem Norton's theorem, alternating current and voltage, definitions of amplitude and phase, average and RMS value of an AC signal

Unit II

Fundamental of semiconductor devices : PN junction diode(working and characteristics) and its applications, Bipolar junction transistor (PNP and NPN), MOSFET (types and applications), Op-amp (features and virtual ground concept), Op-amp (inverting and non-inverting)

Unit III

Introduction to number system and logic gates : Number system (conversion) and codes (B-G,G-B,Excess-3,BCD), logic gates, CMOS logic gates, boolean algebra, SOP and POS, K- Map (up to 4 variables)

Unit IV

Introduction of Arduino and Sensors : Arduino board (pin configuration and description), IR sensor., LDR, basic principle of ultrasonic sensor, Temperature sensor

Unit V

Introduction to Combinational Logic Circuits : Adders, Subtractors, Comparators, Multiplexers and De-multiplexers, Decoders, Encoders, Parity circuits

Unit VI

Introduction to Sequential Logic Circuits : Basic sequential circuits: SR-latch, D-latch, D flip-flop, JK flip- flop, T flip-flop, Master Slave JK flip flop, Conversion of basic flip-flop, Registers: Operation of all basic Shift Registers, Ring counter and Johnson ring counter, Counters: Design of Asynchronous, Synchronous counters, Decade counter using IC-7490

References:

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

2. . DIGITAL FUNDAMENTALS BY THOMAS L. FLOYD , R. P JAIN, PEARSON by THOMAS L. FLOYD , R. P JAIN, PEARSON

3. BASIC ELECTRICAL AND ELECTRONICS ENGINEERING by D.P. KOTHARI, I J. NAGRATH, MCGRAW HILL EDUCATION

4. ELECTRONIC CIRCUIT FUNDAMENTALS AND APPLICATIONS by MIKE TOOLEY, NEWNES PUBLISHERS

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