

# 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 :: understand the fundamental behavior of circuit elements and solve DC networks by different circuit reduction techniques

CO2 :: learn the fundamental behavior and notations of AC circuits and solve AC circuit problems

CO3 :: discuss the working principles and applications of transformers and motors

CO4 :: analyze the working of various semiconductor devices and its applications

CO5 :: distinguish between combinational logic system and sequential logic system

CO6 :: explore the functionality of digital circuits under real and simulated environment

## Unit I

**Fundamentals of D.C. circuits** : resistance, inductance, capacitance, voltage, current, power and energy concepts, ohm's law, Kirchhoff's laws, voltage division rule, current division rule, star-delta transformation, mesh and nodal analysis, dependent and independent sources, superposition theorem, Thevenin's theorem, Norton's theorem, maximum power transfer theorem

## Unit II

**Fundamentals of A.C. circuits** : alternating current and voltage, definitions of amplitude and phase, average value of an AC signal, steady state analysis, RL, RC and RLC circuits, power calculation in RL, RC and RLC circuits, three-phase circuits, Star-Delta circuits and conversion, Phase voltage and In-line voltage, rms value of a.c. signal

## Unit III

**Fundamentals of electrical machines** : Fleming's left hand and right-hand rule, mutual inductance and mutual coupling, transformer - working, concept of turns ratio, instrument transformers, auto-transformer, dc machines- working principles, classification, speed control and applications of dc motors, single and three phase induction motors, application of ac motors

## Unit IV

**PN junction diode** : PN junction diode and its applications, Transistor (PNP and NPN), MOSFET (introduction and symbol, representation /Configuration), Op-amp (features, Virtual ground concept), Op-amp (inverting and non-inverting), Logic gate and Boolean algebra, Boolean Conversion

## Unit V

**Introduction to Combinational Logic Circuits** : Combinational Logic Circuits: Adders, Subtractors, Comparators, Multiplexers and De-multiplexers, Decoders, Encoders, Parity circuits, Logic Families: Introduction to different logic families, Structure and operations of TTL, MOS, CMOS logic families, figure of merits like fan-in, fan-out comparison table

## 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, Counters: Design of Asynchronous, Synchronous counters, Ring counter and Johnson ring counter

## Text Books:

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

## References:

1. BASIC ELECTRICAL ENGINEERING BY D.C. KULSHRESTHA, MC GRAW HILL by D.C. KULSHRESTHA, MC GRAW HILL
2. . DIGITAL FUNDAMENTALS BY THOMAS L. FLOYD , R. P JAIN, PEARSON by THOMAS L. FLOYD , R. P JAIN, PEARSON
3. DIGITAL INTEGRATED ELECTRONICS by H. TAUB AND D. SCHILLING, MCGRAW HILL EDUCATION

