

ECE131:BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

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

Course Outcomes: Through this course students should be able to

- CO1 :: enumerate the basic terminology/definitions of electrical and electronics engineering
- CO2 :: understand the fundamental behavior and notations of electrical circuits
- CO3 :: explain the basic principles and applications of different types of electrical machines
- CO4 :: determine the characteristics of various semiconductor devices
- CO5 :: analyze the working of various filters and operation amplifiers
- CO6 :: illustrate the use of IOT, cloud computing and embedded system in various fields

Unit I

Fundamentals of D.C. circuits : resistance, inductance, capacitance, voltage, current, power and energy concepts, ohm's law, kirchhoff's laws, basic method of circuit analysis, intuitive method of circuit analysis- series and parallel simplification, voltage division rule, current division rule, star-delta transformation, introduction to dependent and independent sources, mesh and nodal analysis, Thevenin's theorem, Norton's theorem, maximum power transfer theorem, network theorems- superposition theorem

Unit II

Fundamentals of A.C. circuits : alternating current and voltage, concept of notations (i , v , I , V), definitions of amplitude, phase, phase difference, RMS value and average value of an AC signal, complex representation of impedance, steady state analysis of ac circuits consisting of RL, RC and RLC (series), resonance in series RLC circuit, power factor and power calculation in RL, RC and RLC circuits, three-phase circuits- numbering and interconnection (delta or mesh connection) of three phases, relations in line and phase voltages and currents in star and delta networks

Unit III

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

Unit IV

Fundamentals of semiconductor devices : introduction to semiconductor devices, Working and operation of PN Junction diode, Characteristics of PN junction diode, working and operation of Zener diode, characteristics of Zener diode, logic gates, Working and Operation of Varactor diode, Testing of diode and BJT, Half wave and Full wave rectifier, Full wave bridge rectifier, MOSFET representation and characteristics, Application of diodes, transistors, rectifiers and MOSFET

Unit V

Fundamentals of filters and operational amplifier : filter examples- band-pass filter, low-pass filter, high-pass filter, operational amplifier abstraction- device properties of the operational amplifier, simple op amp circuits – virtual ground concept, inverting and non-inverting op-amp, active high pass filter, active band pass filter, active band stop filter, properties of operational amplifier, op-amp as an adder and subtractor, op-amp RC circuits – op-amp integrator, op-amp differentiator, active filter, op-amp as a comparator and its application in anti-lock braking systems

Unit VI

Embedded system and its application : introduction to embedded system, comparison of microprocessor and micro-controller, introduction of arduino and sensors, role of IOT and cloud computing in condition monitoring of plant processes, health care, agriculture, manufacturing, automobiles and smart grid

Text Books: 1. BASIC ELECTRICAL AND ELECTRONICS ENGINEERING by DP KOTHARI, MCGRAW HILL EDUCATION

References: 1. BASIC ELECTRICAL ENGINEERING by D.C. KULSHRESTHA, MC GRAW HILL
2. FUNDAMENTALS OF ELECTRICAL ENGINEERING AND ELECTRONICS by B.L.THERAJA, S. CHAND & COMPANY

References:

3. INTRODUCTION TO EMBEDDED SYSTEMS by K. V. SHIBU, MC GRAW HILL
4. ELECTRICAL AND ELECTRONICS TECHNOLOGY by EDWARD HUGHES, PEARSON