EE101 Basic Electronics (3-1-0-8)

Prerequisite: Nil

DC Analysis: Dependent and independent Voltage and current sources, Nodes, Paths, Loops and Branches, Nodal and Mesh Analysis, Superposition, Source Transformations, Thevenins and Nortons Theorems, Maximum Power Transfer. RL, RC and RLC Circuit. AC Circuit Analysis: Sinusoidal Forcing Function, Phasor Relationship for R, L and C, Impedance and Admittance, Phasor Diagrams. Instantaneous Power, Average Power, Complex Power, Apparent Power and Power Factor.

Logic Gates and Combinational Circuits: Number Systems and Binary Codes, Boolean Algebra and Logic Gates, De Morgans Theorems, Sum-of-Product and Product-of-Sum Forms, Algebraic Simplification, Karnaugh-Map Method, Combinational Logic Circuits, Binary Half and Full Adder, Parity Generator-Checker, Sequential Circuits, Storage Elements; NAND and NOR gate Latches, S-R Flip-Flop, J-K Flip-Flop, D Flip-Flop, T Flip-Flop, Counters.

Polyphase Circuits: Balanced Three-phase Systems (Star (Y) & Delta ()), Three-phase Power Measurement, Magnetic Circuit: Amperes circuital law, Application of Amperes circuital law in magnetic circuit, Reluctance and permeance, Analysis of Series magnetic circuit, Analysis of Series-parallel magnetic circuit, Flux linkage, self and mutual inductance. Frequency Response: Low pass and High pass RC and RL circuits, Series and Parallel Resonance, Quality factor.

Diodes: Semiconductor Diode, V-I characteristics of Diode, Half-Wave and Full-Wave Rectifier Circuits, Wave Shaping Circuits, Clippers and Clampers, Zener Diodes. Transistors: Bipolar Junction Transistor, MOSFET: Biasing, Small Signal model, Amplifiers. Operational Amplifiers: Ideal Op-Amp, Application of Op-Amp: Comparator, Inverting and non-Inverting Amplifiers, Differential and Integral Amplifier, Adder-Subtractor.

Texts/ References:

1. W. H. Hayt, J. E. Kemmerly, and S. M. Durbin, Engineering Circuit Analysis, 8th edition, McGraw-Hill, 2013.
2. R. J. Smith and R. C. Dorf, Circuits, Devices and Systems, 5th edition, John Wiley India, 2007.
3. R. L. Boylestad and L. Nashelsky, Electronic Devices and Circuit Theory, 11th edition, Pearson, 2012.
4. N. S. Widmer, G. L. Moss, and R. J. Tocci, Digital Systems, 12th edition. Pearson, 2017.
5. V. D. Toro, Electrical Engineering Fundamentals, 2nd edition. PHI, 2014.