RKUNIVERSITY

SYLLABUS

Course Title	**Electronic Circuit Design Tools**	
Course Code	**EC306**	
Course Credit	Lecture	: 00
	Practical	: 01
	Tutorial	: 00
	Credits	: 01

Course Learning Outcomes

After completion of the course students will be able to:

- **Understand** circuit simulations by using various simulation tools.
- **Demonstrate** the use of simulation tools for solving electronics problems.
- **Illustrate** the various ways to be used for solving circuit analysis problems by using Simulation Tools.
- **Illustrate** the flexibility of Simulation Tools for solving general engineering and scientific problem.
- **Design** Multilayer and Hybrid PCBs.

Detailed Syllabus

Sr. No.	Name of chapter & Details
1	**PROGRAMING FUNDAMENTALS** Basic operations, matrix operations, array operations, complex numbers, the colon symbol (:), m-files - Script files, Function files.
2	**PLOTTING COMMANDS** Graph functions, x-y plots and annotations, logarithmic and polar plots, screen control.
3	**CONTROL STATEMENTS** For loops, if statements, while loop, input/output commands.

4	**DC ANALYSIS** Nodal analysis: loop analysis, maximum power transfer functions.
5	**TRANSIENT ANALYSIS** RC network, RL network, RLC circuit, state variable approaches.
6	**TWO-PORT NETWORKS** Two-port network representations: z-parameters, y-parameters, h-parameters, Transmission parameters, interconnection of two-port networks, terminated two-port networks.
7	**DIODES** Diode characteristics: Forward-biased region, function polyfit, Temperature effects analysis of diode circuits, half-wave rectifier, function fzero, full-wave rectification, zener diode voltage regulator circuit.
8	**Introduction to Circuit Analysis Tools** Introduction, file types, netlist commands. Basic analyses: DC, AC, Transient. Circuit optimization. Models of resistor, capacitor, inductor, energy sources (VCVS, CCVS, Sinusoidal source, pulse, etc), transformer, DIODE, BJT, FET, MOSFET, etc. sub circuits.
9	**Introduction to PCB Design** • Principles of circuit design, design tools, layout techniques. • Characteristics and materials of printed boards, layout and simulation. • Plated through connections, soldering, surface coating, multilayer boards. • Hybrid PCBs: Thick film and thin film technology, material properties and fabrication.
10	**Introduction to Schematic Capture and Simulation Environments** Electronics / Electrical Circuits Simulation, DC and Thevenin's Theorem,Diodes, Transistors.

Instructional Method and Pedagogy:
• Minimum 15 experiments shall be there in the laboratory.

List of Experiments:

1. To **learn** Basic Commands in Simulation Platform.
2. To **demonstrate** selected functions in Signals.
3. To **learn** Mathematical functions in Simulation Platform.
4. To **analyze** Unit Step, Ramp and Impulse Signal.
5. To **examine** Potential divider circuit using Circuit Analysis Tools.
6. To **design** & simulate V-I characteristic of diode.
7. To **design** & simulate V-I characteristic of diode.
8. To **design** & simulate half-wave Rectifier.
9. To **design** & simulate full- wave Rectifier.
10. To **design** & simulate Clamper circuit.
11. To **design** & simulate Clamper circuit.
12. To **design** & simulate BJT as amplifier
13. To **design** & simulate Clipper circuit.
14. To **learn** the Simulation codes for Basic Graphic tools.
15. To **understand** the circuit design process using PCB design tools.
16. To **design** Regulated Power Supply Circuit using PCB design tools.
17. To **learn** Basic Commands in open source simulation softwares.
18. To **learn** the basic commands of Schematic Capture and Simulation Environments
19. To **design** various circuits using Schematic Capture and Simulation Environments.

Reference Books/Text book:

1. John O. Attia “Electronics and Circuit Analysis using MATLAB”, CRC Press, 1999.