

COURSE CODE	COURSE NAME	L-T-P-C	YEAR OF INTRODUCTION
EC233	ELECTRONICS DESIGN AUTOMATION LAB	0-0-3-1	2016
<b>Prerequisite: Nil</b>			
<b>Course Objectives :</b> The primary objective of this course is to familiarize the students, how to simulate the electronics/digital circuits, signals and systems using the soft-wares which are available for the modern design methodologies for the rapid design and verification of complex electronic systems.			
<b>List of Exercises / Experiments</b>			
1	<b><u>Introduction to SPICE</u></b> <p>[Institution can use any one circuit simulation package with schematic entry like EDWinXP, PSpice, Multisim, Proteus or CircuitLab.]</p> <p>Introduction to SPICE software. Recognize various schematic symbols /model parameters of resistor, capacitor, inductor, energy sources (VCVS, C CVS, Sinusoidal source, pulse, etc), transformer, DIODE, BJT, FET, MOSFET, etc., units &amp; values. Use SPICE Schematic Editor to draw and analyse (DC, AC, Transient) simple analog and digital electronic circuits.</p> <p><b>List of Experiments using SPICE [Six experiments mandatory]</b></p> <p>Simulation of following circuits using SPICE [Schematic entry of circuits using standard package, Analysis –Transient, AC, DC]</p> <ol style="list-style-type: none"> <li>1. Potential divider network</li> <li>2. RC integrating and differentiating circuits</li> <li>3. Diode, BJT and MOSFET characteristics</li> <li>4. Diode Circuits (Clipping, Clamping, Rectifiers)</li> <li>5. RC coupled amplifier (Single &amp; two stages)</li> <li>6. RC oscillator (RC phase shift / Wien Bridge)</li> <li>7. Astable multivibrator</li> <li>8. Truth table verification of basic and universal gates</li> <li>9. Half adder /full adder circuits using gates</li> <li>10. 4 bit adder/BCD adder</li> <li>11. Encoder/Multiplexers</li> <li>12. Flipflops/Counters</li> </ol>		
2	<b><u>Introduction to MATLAB</u></b> <p>[Institution can use any one numerical computational package like SciLab, Octave, Spyder, Python (scipy) or Freemat instead of MATLAB]</p> <p><b>Fundamentals, basic operations on array, matrix, complex numbers etc., Script and function files, plotting commands, control statements.</b></p> <p>Writing simple programs for handling arrays and plotting of mathematical functions, plotting of analog, discrete and noise signals, analysing the simple electronic circuits/network using node and mesh equations.</p> <p><b>List of Experiments [Four experiments mandatory]</b></p> <p>Write program and obtain the solutions</p> <ol style="list-style-type: none"> <li>1. Solve /plot the mathematical equations containing complex numbers, array, matrix multiplication and quadratic equations etc</li> </ol>		

	<ol style="list-style-type: none"> <li>Obtain different types of plots (2D/3D, surface plot, polar plot)</li> <li>Generate and plot various signals like sine square, pulse in same window.</li> <li>Plot the diode/transistor characteristics.</li> <li>Solve node, mesh and loop equations of simple electrical/network circuits.</li> <li>Find the poles and zeros hence plot the transfer functions/polynomials</li> <li>Sort numbers in ascending order and save to another text file using text read and sort function after reading n floating point numbers from a formatted text file stored in the system.</li> <li>Plot a full wave rectified waveform using Fourier series</li> </ol>
3	<p><b><u>Introduction to HDL</u></b></p> <p>[Institution can choose VHDL or Verilog as language to describe the problem and any one simulation/synthesis tool like Xilinx ISE, Modelsim, QSim, verilog, VHDL, EDwinXP or ORCAD etc. for the simulation.]</p> <p><b>List of Experiments using HDL</b></p> <p>Write the HDL code to realise and simulate the following circuits: (at least 4 of the following)</p> <ol style="list-style-type: none"> <li>Basic gates/universal gates</li> <li>Combinational Circuits (Half adder/Half subtractor)</li> <li>Full adder in 3 modelling styles (Dataflow/structural/Behavioural)</li> <li>Multiplexer/De-multiplexer</li> <li>Decoder/Encoder</li> <li>4 bit adder/BCD adder</li> <li>Flipflops (SR,JK,T,D)</li> <li>Binary Counters</li> <li>Finite state machines</li> </ol> <p><b><u>Expected outcomes:</u></b></p> <ol style="list-style-type: none"> <li>An ability to apply knowledge of computer, science, and engineering to the analysis of electrical and electronic engineering problems.</li> <li>An ability to design systems which include hardware and software components.</li> <li>An ability to identify, formulate and solve engineering problems.</li> <li>An ability to use modern engineering techniques.</li> </ol>