III Year II Semester **L T P C**

Code:20EE6113 **0 0 3 1.5**

ELECTRICAL SIMULATION LAB

Preamble: The significance of the Electrical Simulation Lab is renowned in the various fields of engineering applications. For an Electrical Engineer, it is obligatory to have the practical ideas about the Electrical Circuits, Converters and Simulation.

Course Objectives:

1. To simulate integrator circuit, differentiator circuit, Buck converter, Boost converter, three phase full convertor.
2. To simulate Bode plots, root locus and nyquist plots for the transfer functions of systems up to 5^{th} order
3. To perform transient analysis of RLC circuit and single machine connected to infinite bus (SMIB).
4. To Simulate D.C separately excited motor using transfer function approach and stability analysis.

Course Outcomes:

1. Able to simulate integrator circuit, differentiator circuit, Boost converter, Buck converter, three phase full converter.
2. Able to simulate Bode plots, root locus and Nyquist plots for the transfer functions of systems up to 5th order.
3. Able to perform transient analysis of RLC circuit and single machine connected to infinite bus (SMIB)
4. Able to Simulate D.C separately excited motor using transfer function approach and stability analysis.

CO – PO & CO – PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1			2					3		2	3	2	-
CO2	3	2			1					3		2	3	2	-
CO3	3	1			2					2		2	2	2	-
CO4	2	2			1					2		2	2	2	-

*1 – Weak, 2 – Moderate and 3 – Strong

S. No **List of Experiments**

1. Simulation of series R-L-C circuits for step, pulse & sinusoidal input.
2. Transfer function analysis of i) time response for step input ii) frequency response for sinusoidal input.
3. Stability analysis using Bode plots, root locus and nyquist plots for the transfer functions of systems up to 5th order.
4. Simulation of Boost converter.
5. Simulation of Buck converters.
6. Effect of source inductance on single phase fully controlled bride rectifier.
7. Simulation of Integrator circuits using op–amp.
8. Simulation of Differentiator circuits using op–amp.
9. Simulation of D.C separately excited motor using transfer function approach.
10. Transient analysis of single machine connected to infinite bus (SMIB).
11. Simulation of three phase full converter using MOSFET and IGBTs.
12. Modeling of transformer and simulation of loss transmission line.

Reference Books:

1. "Simulation of Power Electronic Circuit", by M.B. Patil, V.Ramanarayan, V.T. Ranganathan. Narosha, 2009.
2. MATLAB user`s manual – Mathworks, USA.
3. MATLAB – control system tool box – Mathworks, USA.
4. SIMULINK user`s manual – Mathworks, USA.
5. EMTP User`s Manual.
6. SEQUEL– A public domain circuit simulator available at www.ee.iitb.ac.in/~sequel.