Lok Jagruti Kendra University
University with a Difference

Diploma in Electronics & Communication Engineering

LJ Polytechnic

Course Code:025030405
Design & Simulation Lab

Programme / Branch Name			Diploma in Electronics and Communication Engineering			
Course Name	Design & Simulation Lab				**Course Code**	025030405
Course Type	HSSC	BSC	ESC	PCC	OEC	PEC

Legends: HSSC: Humanities and Social Sciences Courses BSC: Basic Science Courses
ESC: Engineering Science Courses PCC: Program Core Courses
OEC: Open Elective Courses PEC: Program Elective Courses

1) Teaching and Evaluation Scheme

Teaching Hours / Week / Credits				Evaluation Scheme			
L	**T**	**P**	**Total Credit**	**CCE**	**SEE (Th)**	**SEE (Pr)**	**Total Marks**
0	0	4	2	50	-	50	100

Legends:
L: Lectures T: Tutorial P: Practical
CCE: Continuous & Comprehensive Evaluation
SEE (Th): Semester End Evaluation (Theory)
SEE (Pr): Semester End Evaluation (Practical)

2) Prerequisite

- ✓ Basic knowledge of electronic components and circuit.

3) Rationale

It is the era of customized solutions, where fundamental knowledge of electronics and communication principles along with software support plays important role in the prototype application development. Hence the knowledge of popular industrial software helps the Electronics and Communication Engineering diploma students to maintain systems which are based on hardware and software. Programming practices will further help the students to develop indigenous hardware and software-based applications

4) Objectives

- ✓ Simulate and test mathematical and functional aspects of electronics and communication engineering principles using the basic features of software tools. To make familiar with PCB design and various processes involved.
- ✓ Develop script files for analog electronic circuits.
- ✓ Simulate and test analog and digital communication circuits using available functions and toolboxes.
- ✓ Simulate and test Digital electronic circuits using available functions and toolboxes.

5) Contents

Unit No.	Topics	Sub-Topics	Learning Outcomes	% Weightage	Hours
1	Introduction to MALAB and Basic Command	1.1. Introduction to MATLAB 1.2. Layout of MATLAB 1.3. Basic Commands and Syntax	• Arithmetic operation • Matrix operation • Trigonometric Operation	10	4
2	Analog Electronics Circuits	2.1. Plot diode input and output characteristics. 2.2. Plot transistor input and output characteristics. 2.3. Plot MOSFET input and output characteristics. 2.4. Plot LED input and output characteristics. 2.5. Develop a program for different types of waveforms.	• Plot the characteristic curves of Linear and nonlinear analog electronic devices. • Simulate and test model /equivalent circuit of analog electronic devices.	10	4
3	Digital Communication	3.1. Develop a program for AM, PM, FM, DSB, SSB. 3.2. Develop a program for different types of filter circuit. 3.3. Develop a program for Ask, FSK, PSK, QPSK modulation.	• Mathematical equations and functions to represent of analog modulation and demodulation principles • Mathematical equations and parameters to develop analog filter circuits • Mathematical equations and functions to represent of digital modulation and demodulation principles	10	6
4	Digital Electronics	4.1. Simulate AND, OR, NAND, NOR, XOR, NOT 4.2. Develop a model of full adder and subtractor. 4.3. Develop a model of multiplexer and demultiplexer. 4.4. Develop a model for a 3−bit Up / Down binary counter	• Digital circuit: basic gates, combinational and sequential circuits and their truth table, characteristic table, excitation table and waveforms.	10	6

5	Mini Projects	5.1. Assembling of electronic circuit/system on PCB, test and show the functioning. (Any Five)	• Household or lab work usage projects use in daily work.	10	6

6) List of Practicals / Exercises

The practical/exercises should be properly designed and implemented in an attempt to develop different types of skills that students can acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

Sr. No	Practicals / Exercises	Key Competency	Hours
1	Explore the basic features, commands and general structure of the MATLAB environment.	MATLAB Simulation Tool	2
2	Basic arithmetic, array, matrix and plot operation	MATLAB Simulation Tool	2
3	Develop a program to plot waveforms: Sine, Cosine, Square, Triangle	MATLAB Simulation Tool	2
4	Develop a program to plot input output characteristics of diode.	MATLAB Simulation Tool	2
5	Develop a program to plot input output characteristics of NPN transistor.	MATLAB Simulation Tool	2
6	Develop model for various types of rectifiers	MATLAB Simulation Tool	2
7	Develop model for various types of filters	MATLAB Simulation Tool	2
8	Develop a program to plot Amplitude Modulation (DSB) Waveform	MATLAB Simulation Tool	2
9	Develop a program to plot Amplitude Modulation (SSB) Waveform	MATLAB Simulation Tool	2
10	Develop a program to plot FM and PM Waveform	MATLAB Simulation Tool	2
11	Develop a program to plot ASK, FSK, PSK Modulation Waveform	MATLAB Simulation Tool	2
12	Develop model of Multiplexer and Demultiplexer using functions	MATLAB Simulation Tool	2
13	Develop model for Addition and Subtraction of 4bit binary	MATLAB Simulation Tool	2
14	Simulate AND, OR, NAND, NOR, XOR, NOT Gates using functions	MATLAB Simulation Tool	2
15	Simulate full adder using Simulink.	MATLAB Simulation Tool	2
16	Develop a model for a 3−bit Up / Down binary counter using Simulink	MATLAB Simulation Tool	2

9) Reference Books

1) Electronics and circuit analysis using MATLAB by John O. Attia CRC Press, London, New York
2) Introduction to Modeling and Simulation with MATLAB® and Python, S I Gordon, CRC Press, London, New York

10) Open Sources (Website, Video, Movie)

1) https://www.tutorialspoint.com/matlab/matlab_tutorial.pdf
2) https://www.mathworks.com/academia/examples.html