# R0 Documentation:

**1 Introduction**

**1.1 Name of the Laboratory: Communication Systems Laboratory (C.S.L)**

**1.2 Name of the Faculty Member: Mrs. J. SARANYA – Team Lead & Dr. S. Chitra – Domain Expert.**

**1.3 Department: ECE**

**1.4 Institute: Rajalakshmi Engineering College**

**1.5 Email ID:**[**saranya.j@rajalakshmi.edu.in**](mailto:saranya.j@rajalakshmi.edu.in)

**1.6 Lab Overview**

**1.7 Objectives and Purpose of the Virtual Lab:**

**Lab Overview:**

The main goal for this lab is to improve the students understanding in the theoretical concepts by performing the experiments listed under the laboratory section.

The laboratory consists of a virtual simulator, procedure to perform the simulation, theory to provide a good understanding on the functions performed by each block in the simulator and periodic tests to test the students understanding before and after performing the experiment.

**Objectives:**

The students should be made to

• To implement and classify Amplitude & Frequency Modulation & demodulation.

• To implement Pulse Code Modulation & Delta Modulation.

• To implement line coding Schemes.

• To implement Binary Frequency Shift Keying modulation & demodulation schemes.

• To implement & compare Binary Phase Shift Keying & Quadrature Phase Shift Keying modulation & demodulation schemes.

**Purpose:**

To simulate and validate the various functional modules of a communication system.

1.8 **Discipline to which the lab belongs:** E.C.E

1.9 **Syllabi of Lab at various universities**: Communication Systems I Lab – NIT Srinagar, Communication Engineering Lab – IIT Ropur, Analog & Digital communication Laboratory – AICTE.

1.10 **List of experiments:**

**1) Amplitude Modulation and Demodulation**

2) Frequency Modulation and Demodulation

3) Pulse Code Modulation (PCM)

4) Delta Modulation (DM)

5) Binary Frequency Shift Keying (BFSK) Modulation

6) Binary Phase Shift Keying (BPSK) Modulation

7) Quadrature Phase Shift Keying (QPSK) modulation

1.11 **Target Group:** E.C.E, C.S.E, I.T, E.E.E

**2 Virtualization**

2.1 **How do you intend to virtualize the experiments?**

It is proposed to transform circuit diagram for each experiment into web - based and block-based interaction.

2.2 **How will the student get a feel for a real lab?**

The experiments will be performed on a virtual simulator tool under the guidance of the faculty where the faculty would demonstrate the step by step procedure to be followed in order to attain the necessary outputs followed by which all the students could perform the same and record the same. Also, there would a test session before/after performing the test section so as to test the understanding level of the students before/after performing the simulation

2.3 **Will you be using animations?**

Yes

**3 Technologies Used.**

3.1 **Software to be used for Web interface** – HTML5, CSS3, JS-ES6

3.2 **Software to be used for back-end** – JS- ES6

3.3**Any other**

**4 Documentation**

4.1 **Online manual**: This will be prepared and uploaded on the website, that will be specially created for this virtual lab.

4.2 **Step by step procedure**: This will be prepared and uploaded under each experiment.

4.3 **Quiz for self-evaluation**: This will be prepared and uploaded under each experiment.

4.4 **Related resources**: Theory information along with mathematical equations ( if any needed) will be uploaded.

**5 Student Feedback and Learning**

5.1 **How will you collect feedback and use them**?

A model feedback form will be designed and will be sent via e-mail to all the participating students to take their feedbacks.

5.2 **What is the actual learning component?**

The basic aim of the proposed project is to expose the students to gain hands on experimentation in various functional blocks of communication systems remotely. This project will enable the students to understand various analog and digital modulation schemes and evaluate their effectiveness in retrieving the original message.

5.3 **After the Virtual Lab experience, can the student perform the experiment in the real lab?**

Students will be exposed sufficiently during virtual lab experiments and, they can perform and analyse similar experiments in real lab easily.