**Round 1**

**Experiment Design**

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### Department: Electronics and Communication Engineering

### Discipline: Electronics and Communication Engineering

### Name of the Lab: COMMUNICATION SYSTEMS LABORATORY

**Name of experiment**: AM Modulation and Demodulation

### FOCUS AREA: Instrumentation and Practical skills, Experimentation

**1. Learning Objectives and Cognitive Level:**

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| --- | --- | --- | --- |
| **Sr. No** | **Learning Objectives** | **Cognitive level** | **Action Verb** |
|  | To understand what is Amplitude modulation. | Remembering | What |
|  | To interpret the degrees of modulation | Understanding | Interpret |
|  | Demonstrate and identify the level of modulation test the knowledge of student in base band signaling schemes through implementation of Amplitude Modulation and Demodulation | Applying | Identify |

**2. Instructional Strategy:**

**2. 1 Instructional Strategy:**

Expository

**2.2 Assessment Method:**

Summative assessment

**2.3 Description of section:**

**Aim:**

This section explains the objective of the Virtual lab .

**Theory:**

By reading this section the user will get to know the theoretical concepts of the experiment which will make it easy for them to understand the simulation when done in person.

**Pretest:**

To check the understanding of the user till this part some basic question from the theory have been asked in this Section.

**Procedure:**

Before jumping into the simulation, this section clearly explains the step by step instructions to simulate the experiment and get the output.

**Simulation:**

Important part of the Lab where the user will perform the experiment in a virtual environment.

**Posttest:**

Final part of the Virtual lab process is to check the clear understanding of the user after performing the experiment is analyzed in this section.

**3.Task & Assessment Questions:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sr. No.** | **Instructions given by the Teacher** | **Tasks to be done by the Students** | **Assessment questions aligned to the task** |
|  | Clear explanation regarding the signal involved in amplitude modulation will be given. The three degrees of modulation available based on value of modulation index will be instructed clearly.  Formula for calculating Modulation index will be given.  Formula for calculating Modulation index will be given.  Formula for calculating Modulation index will be given. | To understand when Decay/Distortion/Amplification/Attenuation of the signal will occur. Student should be able to identify the degree of modulation based on the signal level.  With the use of given formula, student will find out modulation Index.  With the use of the given formula student will be able to calculate the value of modulating signal voltage.  With the use of the given formula student will be able to calculate the value modulating signal voltage which will cause over modulation. | \_\_\_\_ occurs when the amplitude of the modulating signal is greater than the amplitude of the high frequency signal?a)Decay b)Distortion c)Amplification d) AttenuationWhen does over-modulation occur? a) Modulating signal voltage < Carrier voltage b) Modulating signal voltage > Carrier voltage c) Modulating signal voltage = Carrier voltage d) Modulating signal voltage =0What is the modulation index value if Vmax=4.7v and Vmin=2.2v? a)0.5 b)0.362 c)0.425 d) 0.14What is the modulating signal voltage if the maximum and the minimum voltages on the wave was observed to be 4.7v and 2.2v respectively? a)2.35v b)2.12v c)1.85v d) 3.21v Which of the following modulating signal voltage would cause over-modulation on a carrier voltage of 12v? a)10.5 b)10.99 c)11 d) 13 |

### 4. Simulator Interactions:

|  |  |  |  |
| --- | --- | --- | --- |
| Sr. No | What students will do? | What Simulator will do? | Purpose of the task |
|  | Students will decide on the frequency of operation with the help of design. | Based on the set frequency the signals are generated. | To understand the frequency range of AM signal applications. |
|  | The amplitude value of both message signal and carrier signal will be set using the slider provided. | Based on the set amplitude the signals are Modulated and generated. | To understand the various status of the signal when it undergoes Decay,Distortion,Amplification and Attenuation |
|  | Note down the output signal envelope and identify the degree of modulation. | Modulated signal can be varied by varying the set amplitude | To understand the various degrees of modulation |
|  | Note down the output of the demodulator and compare with the input signal of the modulator. | Based on the received signal demodulated signals are generated. | Will understand how far the modulated signal is in equivalence with the demodulated signal. |