CENG 3131: Lab for Telecom & networks – Lab 3 Modulation Waveforms

Goals: The purpose of this lab is to use the Multisim to generate ASK, FSK, AM, and FM Waveform. You will also observe the spectrum of these signals.

1. Introduction

In this Lab you will learn Modulation and Modulation Techniques. The lab is based on Multisim online.

Read through the entire lab and scan any supplied files before starting work. Note, before running a simulation, you should always have a general understanding of how your circuit works.

2. TASK 1: Amplitude Modulation

Follow the figure given below to build the circuit. Then answer the questions.
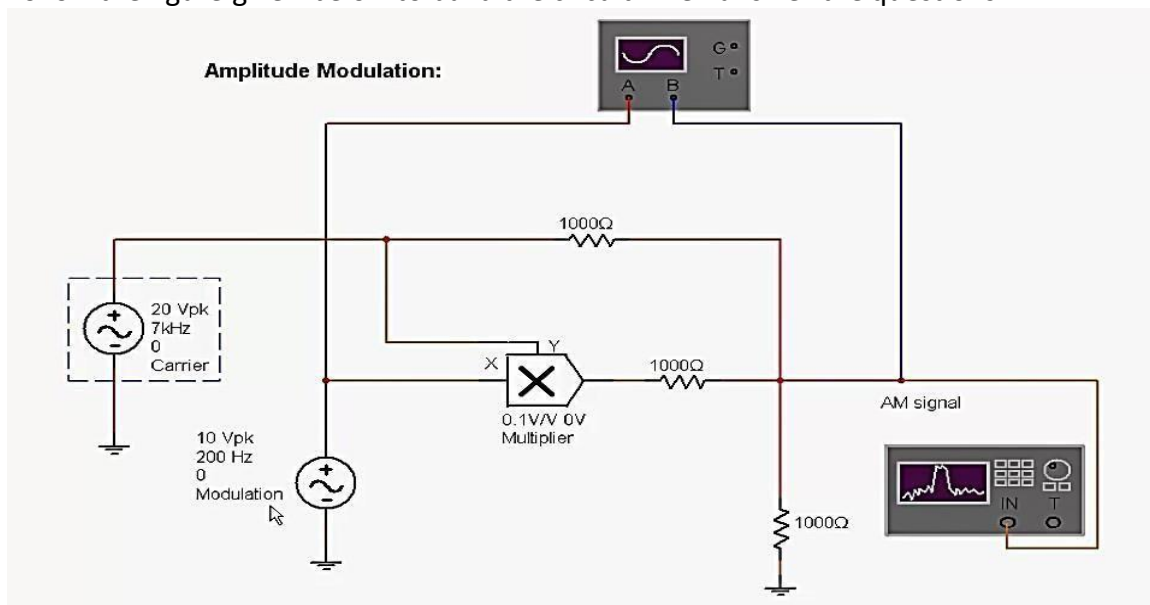
1. You need two AC power sources, one for the carrier, one for the signal. The value set is given.
2. The two signals will go to the multiplier. You can find the multiplier in the control function blocks component group. The output gain is set to 0.1 V/V.
3. Oscilloscope and spectrum analyzer are used to monitor and analyze the AM modulation.

Question:

1. In your lab book save a screen of the circuit.
2. Run your circuit and open the oscilloscope to monitor the signal. Save the screen from the oscilloscope.
3. Close watch the spectrum analyzer. Please point out the center frequency

3. TASK 2: Digital Modulation - ASK

Amplitude shift keying (ASK) in the context of digital communications is a modulation process, which imparts to a sinusoid two or more discrete amplitude levels.
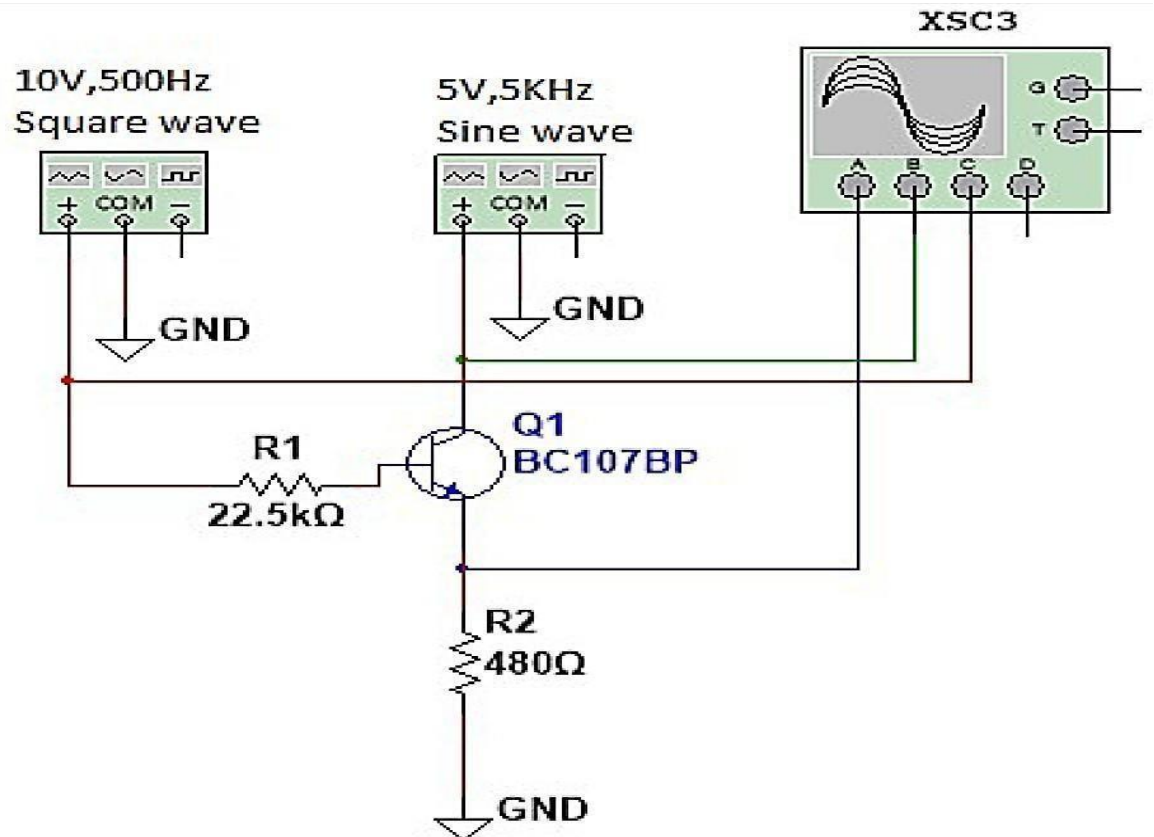

1. Use two function generators, one for digital signal, and one for the carrier signal.
2. The two outputs from function generators will go to an NPN bipolar planner low power transistor.
3. A three probes oscilloscope is used to show the figure.

Question:

1. In your lab book, please capture the circuit.
2. Please show the outputs from the oscilloscope. Adjust the values in square wave and explain what you observe.

4. Task 3: Digital Modulation – FSK

In the following, you will generate FSK signal modulated by a square wave representing a string of 1's and 0's (digital information source.)
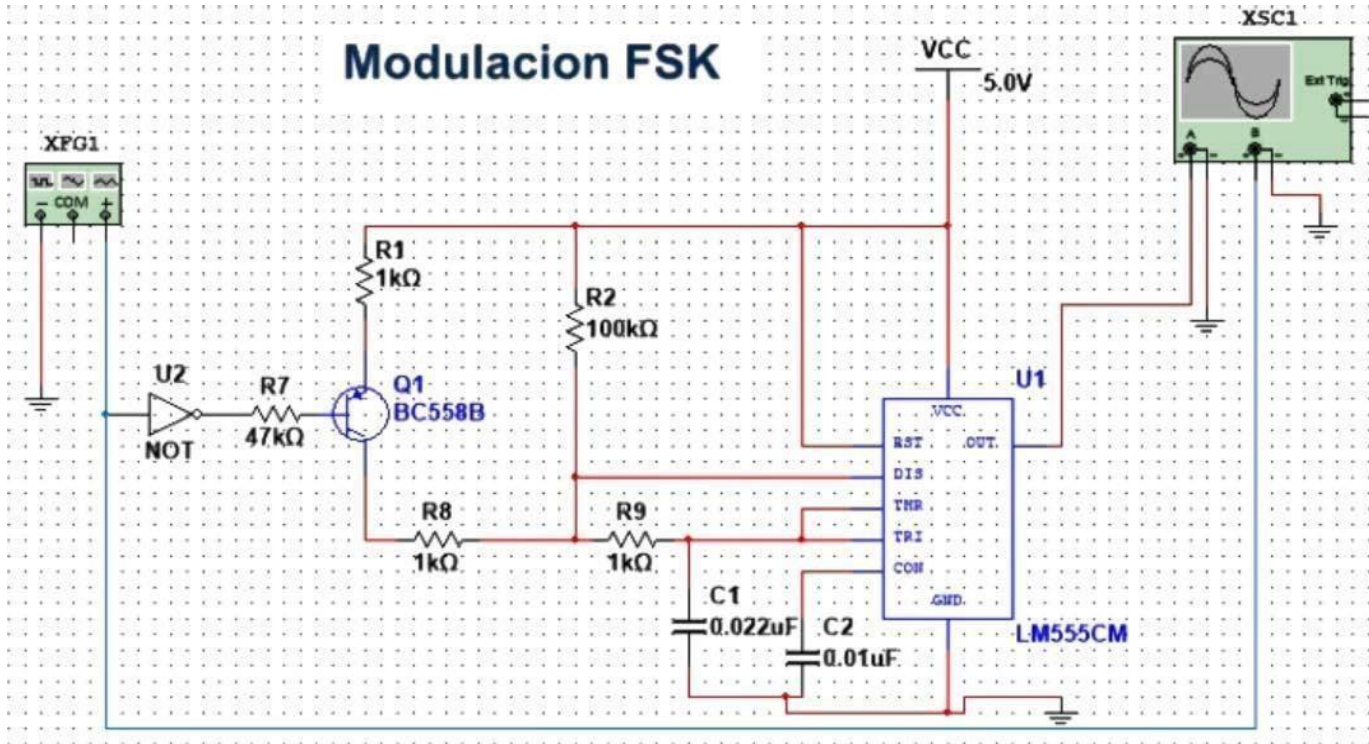
1. Follow the figure to finish the wiring.

Questions:

1. Please capture your circuit in the lab report.
2. Please give the parameter setting for the Function generator.
3. Please show the result in the oscilloscope.

5. Laboratory Report

In no later than 7 days from the starting time of your lab section, Each student will submit their own individual lab reports on the blackboard. Your report should have the reporting requirements needed for all tasks. **The TA will take off a significant number of points if you do not follow the lab template.**

6. GRADING POLICY

- Completion of Task 1 with results included in a lab report (15%)
- Completion of Task 2 with results included in a lab report (25%)
- Completion of Task 3 with results included in a lab report (25%)
- Completion of Task 4 with results included in a lab report (25%)