Birla Institute of Technology & Science, Pilani, Rajasthan
First Semester 2021-2022
Mid-Semester Lab Test (14-11-2021)

Course: EEE F311 Communication Systems
Instructor-in-Charge: S M Zafaruddin

Duration: 120 Minutes, Marks =10

Instructions

- Make a folder named as IDname in the desktop.

- Make .m files and name them as Q1a underscore yourID etc.

- Make a word file with name IDname.

- Compile the code/plot/result/observation/conclusion in the word doc.

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1. The ringing tone comprises frequencies of 440 and 480 Hz and a cadence of 2 seconds ON and 4 seconds OFF. However, the ON duration contains another interference tone of 1000 Hz.

   (a) Design a filter (do not use in-built function "filter") for suppressing the frequency tone 1000 Hz. Verify the results by plotting the frequency spectrum of the input/output signals, and time and frequency response of the filter. [**2 Marks**]

   (b) Design a SSB transceiver (transmitter and synchronous detector) by choosing an appropriate carrier frequency and transmit power over a channel $h(t) = \frac{1}{d^2}\delta(t)$, where $d > \lambda_c$ (λ_c: wavelength of carrier signal). Plot the time-domain message signal and demodulated signal in two sub-figures. Also plot the time-domain and frequency-domain of modulated signals in two sub-figures. [**3 Marks**]

2. You are given an audio song "happy.wav". Keep this file into your working folder. Use the real-time code.

   (a) Use amplitude modulation with appropriate carrier frequency. Plot the modulated signals in time and frequency in two sub-figures for 10 seconds. Demodulate the AM signal with the minimum carrier power and appropriate carrier frequency using envelop detector. Plot the time-domain message signal and demodulated signal in two sub-figures for 10 seconds. [**2 Marks**]

   (b) Run the real time code for whole duration and use the command "sound" on the demodulated time-domain signal to verify the received audio song. We will evaluate after listening the detected song. [**3 Marks**]