# ADVANCED DIGITAL COMMUNICATIONS
## Lab Assignments

Following AAT simulation and demonstration to be done in ADC lab as part of AAT

Simulation : MATLAB/OCTAVE/SIMULINK/GNU radio

HARWARE:VSG/VSA/SDR

**Open ended Experiments**

1. Given the binary sequence b = 1,0,1,1, 0,0, 1, 1; sketch the waveforms representing the sequence using the following line codes: a. unipolar NRZ; b. polar NRZ; c. unipolar RZ; d. bipolar RZ; e. manchester. Assume unit pulse amplitude and use binary data rate Rb = 1 kbps(MATLAB). Observe PSD of these line codes on

2. Consider the digital baseband transmission through bandlimited channel having FIR filter model having impulse response h(n) of length 4. Design suitable block to compensate for this channel model at the receiver. Show the eye-pattern prior to and after including this block and analyse importance of this block . (assume noiseless transmission. You can also use any telephone channel models available )

3. Demonstrate BER performance of digital communication system employing any two modulation schemes you have studied. Assume input bits to be $10^5$ bits. Use AWGN channel. Compare the schemes in terms of BW, BER and SNR required through plots. Also plot constellation diagram and display the spectrum on VSA

4. Demonstrate use of DS OR FH spread spectrum system for CDMA system (MATLAB) . Generate PN sequence required and also test for its correlation property. Demonstrate same on GNU radio using SDR

5. Band-Pass Communication- .1 Generate 100 samples from a speech signal and prepare a binary representation of this for transmission over a band-pass channel. Parameters that specify the transmitter, and channel characteristics are:
   i)A/D conversion use - 8-bit, mu -law quantization.
   ii)Transmitter –Use Digital modulation type: BPSK/BFSK. Binary data rate Rb = 100 kbps. Iii)Channel type- AWGN /Fding channels
   iV)receiver-Correlator or Matched filter receiver such that Bit Error Rate:
    Pe = 10-⁴ required . i)Simulate this system ii)Observe spectrum on VSA

6. Demonstrate generation and detection of MPSK and MFSK performance for coherent detection with BER curves and write your comments
7. Demonstrate QPSK transmission and detection for given sequence ( take binary value of last two digits of your USN and append to 110110 II0110XXXXX(LDC 01to 18 USN)-on MATLAB/SDR

8. Using VSA and VSG , demonstrate spectrum of different modulation schemes

# GUIDELINES:

**Timelines** – Submit by 10th APRIL2021. Evaluation based on demo and viva during last working week of the semester, as per convenience.

**Marks**- Total CIE weightage For AAT
20 marks with following breakup
a. Block description for selected questions
b, Design and execution in MATLAB
c. Justification and Analysis with plots/graphs
d. good write up

**Report maintenance** – Students are expected to maintain report for program and observation and submit at end

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-SUMA M N.(course Coordinator)