Experiment (6)
Line Codes

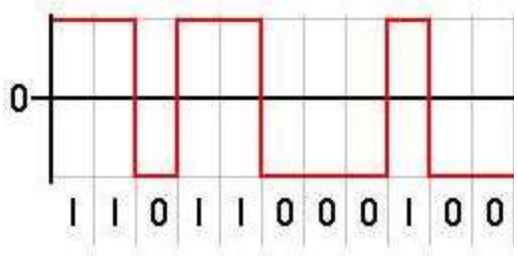
Objective:

(1) Compare the different types of line codes used in digital communications.

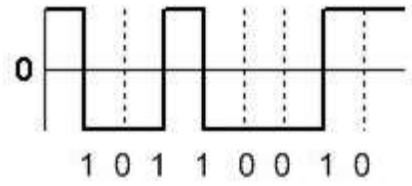
Theoretical Background:

(1) Line codes are also called **digital baseband modulation**.
(2) There are many different types of line codes and each one of them has an advantage from a certain point of view.
(3) The main types are :

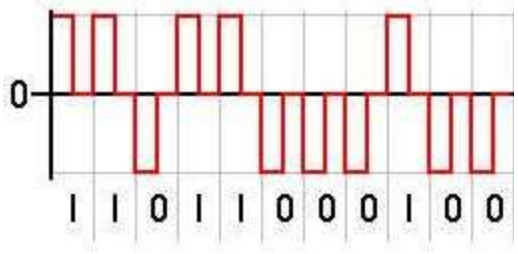
i- Non-return to zero.



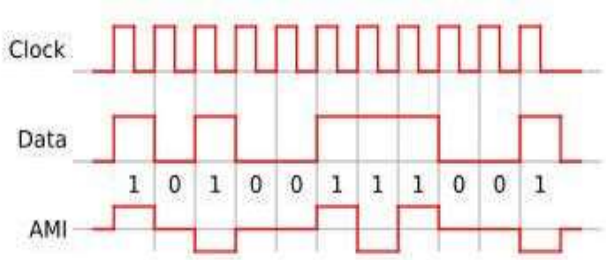
ii- Non-return to zero inverted.



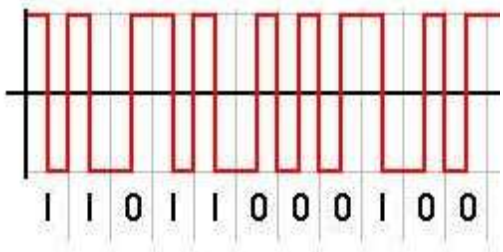
iii- Return to zero.



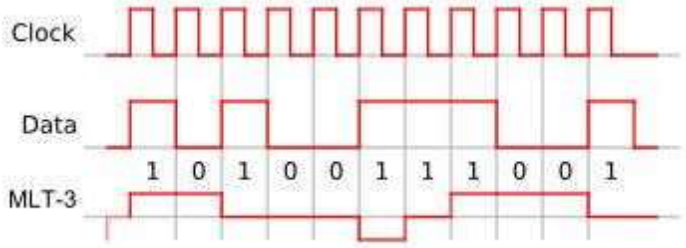
iv- Alternative mark inversion (AMI)



v- Manchester coding



vi- Multi-level transmission 3



Procedure:

(1) Generate random bits of zeros and ones.
(2) Modulate this same vector using the different types of line codes.
(3) Plot a sample of all previous line code modulation and plot them under each other on the same figure using subplot, ex subplot(6,1)(make sure that all the types have the same periodic time Ts).
(4) Find the power spectrum density of each code, and plot them in the same figure using subplot as previous (you may try "`psd`" function on the matlab).
(5) Comment on each of the figures.

Report requirement:

(1) Well commented M-file.
(2) Softcopy report containing required figures and the comments on each figure.
(3) Which type of signal has the highest bandwidth? Comment.
(4) Mention the advantages and disadvantages of each line code.
(5) Mention in the report 2 other used line codes and explain them mentioning the main advantages or disadvantages.