COLLEGE OF ENGINEERING & TECHNOLOGY

Department : Electronics & Communication Engineering

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Course Title : Telecommunication Systems Engineering

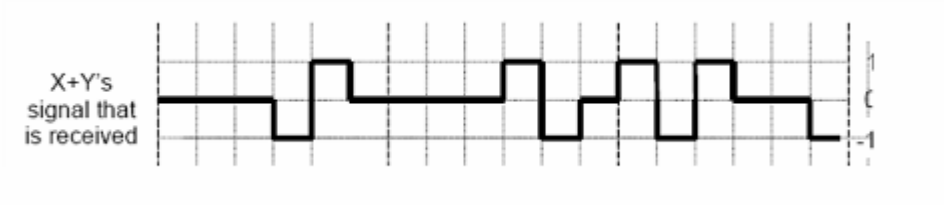
Course Code : EC 551

Sheet (7)

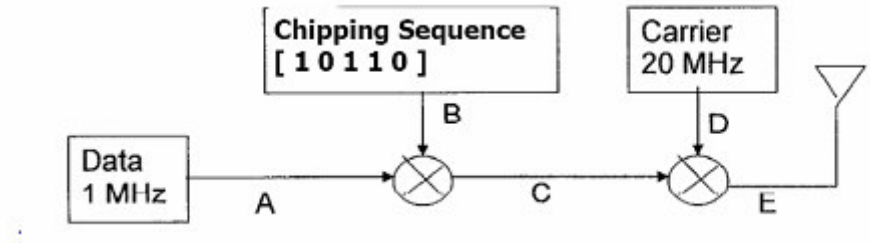
Spread Spectrum – CDMA – WLAN

1. Create Walsh matrix for W8, and Show that code 3 and 7 are orthogonal.

2. Two mobiles, X and Y are transmitting concurrently using CDMA technique. A receiver hearing both of these transmissions receives the combined signal X+Y, and uses CDMA technique to obtain the original message signal (data bits) of mobile X. the receiver has the codeword of X as 010011. Obtain the data bits (message signal) that are transmitted from X.



3. Assume a DSSS system as presented below.



   a. Sketch the signals at A, B, C, D, and E as a function of time for data [1 0]. All signals are 10 volt. Peak-to-Peak.
   b. Sketch the signals at A, B, C, D and E as a function of frequency. Clearly label your axes.

4. A WLAN uses IEEE 802.11 standard with RTS/CTS, and it operates in DCF mode. After accounting for all transmission overhead, derive the expression for the maximum data rate available to (useful user) data as a function of DIFS and SIFS. Assume:
   - Max data rate = 54 Mbps
   - RTS = 20 Bytes
   - CTS, ACK = 14 bytes
   - Data = 2346 bytes