

Assignment - 3
Semester: Summer2023
Submission: 20/08/2023 (in Class)
Total Marks: 20
Total Questions: 5

1. a. Suppose you have two channels among which 1 channel has a bandwidth of 1500 kbps and one with 1200 kbps. **What** is the smartest way to multiplex these channels without involving too many extra bits? Draw and **validate** with visual representation to aid your reasoning.
b. **Explain** how DSSS achieves bandwidth spreading and privacy in brief.
c. **What** is the minimum number of bits in a PN sequence if we use FHSS with a channel bandwidth of $B = 5\text{Hz}$ and bandwidth of spread spectrum $B_{ss} = 250\text{ KHz}$? [6]
2. Suppose, you are given with the k-bit pattern and Carrier Frequency as follows:

k-bit pattern

10 11 01 00

k-bit	Carrier Frequency
00	250kHz
01	150 kHz
10	350 kHz
11	450 kHz

- Draw** FHSS cycle 3 times using the above pseudo random generated k-bit pattern and given frequency table. (** Hint: Draw the Carrier frequency graph against hop period) [3]
3. Suppose, you have 9 channels, each of 64 MBps. You have to use synchronous TDM to multiplex these channels. If each channel passes 3 characters during each input slot, answer the following: [6]
 - a. What is the size of an output frame in bits?
 - b. What is the input bit duration?
 - c. What is the output slot duration?
 - d. What is the output bit duration?
 - e. What is the output frame rate?
 - f. What is the output data rate?

4.

1	0	0	1	1
1 0 1 1 0 0 1 0 1	1 0 1 1 0 0 1 0 1	1 0 1 1 0 0 1 0 1	1 0 1 1 0 0 1 0 1	1 0 1 1 0 0 1 0 1

Sketch the spread signal from the above original signal and the given spread code. [2]

5. **Distinguish** between the two basic multiplexing techniques (FDM and TDM) using appropriate diagrams.[3]