8. Discuss the following in detail :

(a) Signal Space Dimensionality 10

(b) Frequency Hopped Spread Spectrum. 10

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BT-6/M-14 **8612**

DIGITAL COMMUNICATION

ECE-308-E

Time : Three Hours] [Maximum Marks : 100

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) What is Sampling Process ? How is this process implemented in communication systems ? **8**

(b) How will you achieve pulse amplitude modulation ? Explain with the help of proper circuit diagram. **12**

2. (a) What is quantization noise ? How will you minimize it ? Discuss. **8**

(b) Explain the working of Differential Pulse Code Modulation. What are its limitations ? How will you overcome those ? **12**

Unit II

3. (a) Why is Intersymbol Interference generated ? Explain giving mathematical analysis. **8**

   (b) Derive the mathematical expression for probability of error of the matched filter. **12**

4. (a) Discuss the significance of eye patterns.

   (b) Describe the following :

   (i) Adaptive Equalization **8**

   (ii) LMS Algorithm. **12**

Unit III

5. (a) What is Gram-Schmidt Procedure ? How is this used to construct orthonormal set of functions ? Illustrate. **10**

   (b) Discuss the detection of known signal is noise. **10**

6. (a) Show a typical power spectra of a binary PSK signal and explain it. **8**

   (b) The values of Eb/No required to realize an average probability of symbol error Pe = 10^{-4} using coherent binary PSK and coherent FSK systems are equal to 7.2 and 13.5 respectively. Using the approximation :

$$erfc(\mu) \cong \frac{1}{\sqrt{\pi}\,\mu} \exp(-\mu^2)$$

   determine the separation in the values of Eb/No for Pe = 10^{-4} using coherent binary PSK and DPSK. **12**

Unit IV

7. (a) A PN sequence is generated using a feedback shift register of length $m = 4$. The chip rate is 10^7 chips/second Find the following parameters : **12**

   (i) PN sequence length

   (ii) Chip duration of the PN sequence

   (iii) PN sequence period.

   (b) A direct sequence spread binary phase shift keying uses a feedback shift register of length 19 for the generation of PN sequence. Determine the processing gain. **8**