

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
M.Tech., Winter 2017 - 18 Examination

Semester: 2
Subject Code: 03204153
Subject Name: Advanced Digital Communication

Date: 10/01/2018
Time: 02:00 pm to 04:30 pm
Total Marks: 60

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

- Q.1** A) What is Ergodic random process? With an example explain it in detail. (05)
 B) What is simplex signal and bi-orthogonal signal? List out properties of simplex and bi-Orthogonal signals. (05)
 C) Enlist the properties of Hilbert Transform (05)

Q.2 Answer the following questions. (Attempt any three) (Each five mark) (15)

- A) State different types of memory less modulation methods. Explain any one in detail
- B) Explain Minimum shift keying (MSK). Draw state trellis for MSK.
- C) Explain Correlation Demodulator with necessary equations.
- D) Binary PAM signals have a two possible signal points are $s_1 = s_2 = \sqrt{E_b}$, where E_b is the energy per bit. The prior probabilities are $P(s_1) = p$ and $P(s_2) = 1 - p$. Determine the metrics for the optimum MAP Detector when the transmitted signal is corrupted with AWGN.

Q.3 A) With suitable example, explain Gram-Schmidt Procedure. (07)

B) Consider the three waveforms $f_n(t)$ shown in **Figure.1** (08)

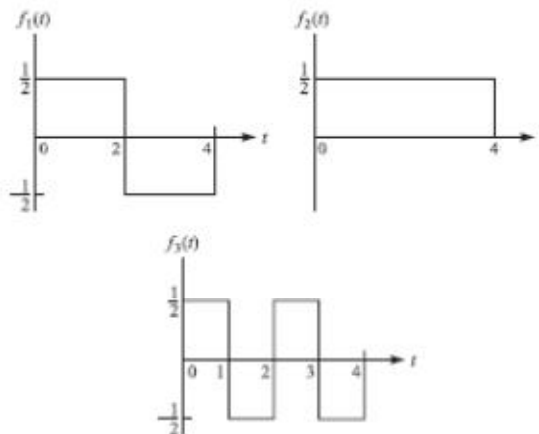


Figure.1

- (i) Show that these waveforms are orthonormal.
- (ii) Express the waveform $x(t)$ as a linear combination of $f_n(t)$, $n = 1, 2, 3$, if

$$x(t) = \begin{cases} -1 & 0 \leq t < 1 \\ 1 & 1 \leq t < 3 \\ -1 & 3 \leq t < 4 \end{cases}$$

and determine the weighting coefficients.

OR

- B) Consider the four waveforms shown in **Figure.2** (08)
- (i) Determine the dimensionality of the waveforms and a set of basis functions.
 - (ii) Use the basis functions to represent the four waveforms by vectors $s_1, s_2, s_3,$ and s_4 .
 - (iii) Determine the minimum distance between any pair of vectors.

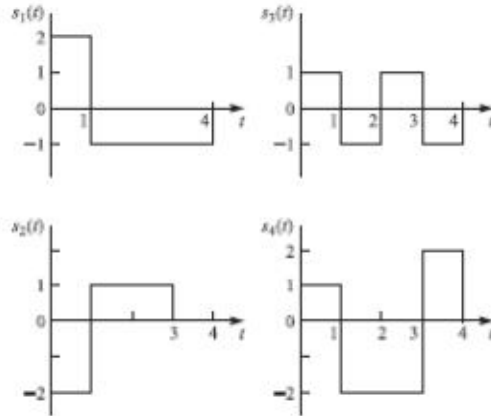


Figure.2

- Q.4** A) Write short note on Design of Band limited signals with controlled ISI. (07)

OR

- A) Explain Early-late gate synchronizers. (07)
- B) Discuss in brief: Statistical Model for Fading Channels and Characterization of Fading Multipath Channels. (08)