Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – II • EXAMINATION – WINTER 2012

Subject code: 1722202 **Date: 31-12-2012**

Subject Name: Advance Digital Communication

Time: 10.30 am – 01.00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 (a) Explain representation of band-pass signals and systems in terms of equivalent low-pass waveforms. Also explain response of a band pass system to a band pass signal. **07**

(b) Draw the block diagram and explain in detail of the following **07**

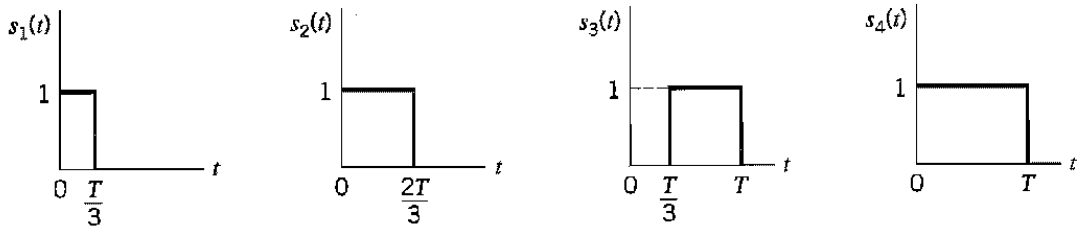
(i) M-ary PSK receiver

(ii) QAM receiver.

Q.2 (a) Following figure displays the waveforms of four signals $s_1(t)$, $s_2(t)$, $s_3(t)$ and $s_4(t)$. **07**

(i) Using the Gram- Schmidt orthogonalization procedure, find an orthonormal basis for this set of signals

(ii) Construct the corresponding signal- space diagram



(b) Write short notes on **07**

(i) Orthogonal Multidimensional Signals

(ii) Simplex Multidimensional Signals

OR

(b) Derive equations of Basis functions and Euclidean distance for $\pi/4$ QPSK digital modulation technique. Draw the constellation diagram for same. Find the bit energy if amplitude of $\pi/4$ QPSK modulated signal 2V peak to peak and 2μs over which symbols exists. **07**

Q.3 (a) State different types of memoryless modulation methods. Explain one of in detail. **07**

(b) Explain in detail with analysis correlation type demodulator for optimum receiver **07**

OR

Q.3 (a) State different types of nonlinear modulation methods with memory. Explain one of in detail. **07**

(b) Explain in detail with analysis Matched-filter type demodulator for optimum receiver **07**

Q.4 (a) Explain in detail with analysis symbol by symbol detector for signals with memory used for optimum receiver. **07**

(b) Evaluate the probability of error for M-ary PAM **07**

OR

Q.4 (a) Explain in detail with analysis maximum likelihood sequence detector for optimum receiver. **07**

Q.4 (b) Evaluate the probability of error for M-ary PSK **07**

Q.5 (a) Write short notes on “Design of band-limited signals with no ISI” **07**

	(b)	Define equalizer and list various types of equalization methods. Discuss the error rate performance of linear MSE equalizer.	**07**

OR

Q.5	**(a)**	Write short notes on “Design of band-limited signals with controlled ISI”	**07**
	(b)	Give answer of following questions (i) Describe a discrete-time model for a channel with ISI with an example. (ii) List the key features of OFDM system.	**07**

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