Exam.Code:0969
Sub. Code:34526

2124

M.E. (Electronics and Communication Engineering)
First Semester
ECE-1103: Advanced Digital Communication
(For UIET Only)

Time allowed: 3 Hours Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Unit. Use of scientific calculator is allowed.

x-x-x

I. Answer the following:-

(a) What do you mean by multi-dimensional signaling?

(b) What is carrier synchronization and symbol synchronization?

(c) Express Nyquist criterion in frequency domain for pulse shaping to realize ISI free transmission?

(d) Draw waveforms of orthogonal and bi-orthogonal signals.

(e) What is the mathematical model of linear time variant filter channel? (5x2)

UNIT - I

II. a) Draw signal space for (i) 8-QAM (ii) QPSK (iii) CPFSK with h=2/3 (iv) CPFSK with h=1/3 (v) 8-level PAM.

b) Prove that energy of bandpass signal is equal to half of energy of its low pass equivalent signal. (2x5)

III. a) Explain how CPFSK is different from FSK. Give its mathematical representation.

b) Explain PSD of CPM and CPFSK signals. (2x5)

IV. a) Digital information is to be transmitted by carrier modulation through an additive Gaussian noise channel with a bandwidth of 100 kHz and $N_0 = 10^{-10}$ W/Hz. Determine the maximum rate that can be transmitted through the channel for four phase PSK, binary FSK, and four-frequency orthogonal FSK, which is detected coherently.

b) What is the function of signal demodulator in receiver? Explain correlation demodulator in detail. (2x5)

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UNIT - II

V. a) Explain early-late gate synchronization for symbol timing estimation.

b) Explain symbol-by-symbol suboptimum detection of information symbols for controlled ISI with suitable example. (2x5)

VI. a) Explain maximum likelihood criterion for carrier phase estimation. Based on ML criteria, derive carrier recovery of double sideband PAM with a decision feedback PLL.(5)

b) Design OFDM system with following parameters; total delay spread is 300 ns, bit rate is 600Mbps and bandwidth is $\leq$ 16MHz. (2x5)

VII. a) With suitable examples explain multi-channel and multi carrier systems.

b) A DSSS system is used to resolve the multi-path signal components in a two path radio signal propagation scenario. If the path length of the secondary path is 300m longer than that of direct path, determine the minimum chip rate necessary to resolve multi-path components. (2x5)

x-x-x