

2023

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 Part. Use of scientific calculator is allowed.

x-x-x

- I. (a) In pass-band PAM system, we are using rectangular pulse as carrier. Explain why (2)
 (b) Why we use basis functions to represent any digital modulation technique? (2)
 (c) What is the mathematical model for linear time variant filter channel? (2)
 (d) What is the basic principle of correlation receiver. (2)
 (e) What do you mean by likelihood function. (2)

Part- A

- II. (a) Explain full and partial response CPM modulation techniques along with phase trajectory for binary CPFSK. (5)
 (b) Calculate power spectral density of rectangular pulse having amplitude A within 0 to T time duration. (5)
- III. (a) What are discrete and continuous channel models. Explain its mathematical models. (5)
 (b) Show that PSD of received signal is equal to the product of PSD of input signal and magnitude square of frequency response of the channel. (5)

IV. Consider Signal

$$s(t) = \begin{cases} (A/T)t \cos 2\pi f_c t & 0 \leq t \leq T \\ 0 & \text{otherwise} \end{cases}$$

- (a) Determine the impulse response of the matched filter for the signal.
 (b) Determine output of matched filter at $t=T$. (10)

Part-B

- V. (a) Explain model of phase locked loop. Derive its transfer function. (5)
 (b) Explain the effect of additive noise on the phase estimation. (5)
- VI. (a). Derive condition for maximum likelihood timing estimate. (5)

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(2)

(b) Explain spectral characteristics of OFDM systems along with its mathematical representation. (5)

VII. (a) Explain three randomness properties that make PN signals appear to be random. (5)

(b) Explain analytical method in generating DSSS signal with QPSK modulator and draw all possible demodulation structures. (5)

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