

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

M.Tech S1 (R,S) Exam Dec 2020

Cluster: **KOLLAM**

Branch: ECE

Specialisation: Communication Systems

02EC6231 ADVANCED DIGITAL COMMUNICATION

Time: 3 hrs

Max. Marks: 60

Instructions: *Answer All Questions from Part A, each carrying 9 marks.*
Answer any Two full question from Part B, carrying 12 marks.

PART A

1. (a) The signal $s_1(t)$, $s_2(t)$ and $s_3(t)$ are to be transmitted over AWGN channel with noise power spectral density $N_0/2$. The signals are

$$s_1(t) = \begin{cases} 1 & 0 \leq t \leq T \\ 0 & \text{otherwise} \end{cases}$$

$$s_2(t) = \begin{cases} 1 & 0 \leq t \leq T \\ -1 & \frac{T}{2} \leq t \leq T \\ 0 & \text{otherwise} \end{cases}$$

$$s_3(t) = -s_2(t)$$

- (i) Determine the dimensionality of the signal space
(ii) Determine appropriate basis function for the signal space
(b) What is the relation between Correlation receiver and Matched filter receiver?
2. (a) Define Likelihood function
(b) Explain the block diagram for Correlation receiver in order to find the best estimate of transmitted symbol m_i .
3. (a) Explain Raised cosine spectrum.
(b) A binary PAM is required to be transmitted over a pair of copper wire with an absolute bandwidth of 75 kHz. If the bit duration is 10 μ sec, find the roll-off-factor required for the raised cosine spectrum satisfying the above requirement.

4. (a) Explain the block diagram for Frequency Hopping Spread Spectrum (FHSS).
- (b) The DSSS modulation has the following parameters. Data sequence bit duration, ($T_b=4095\text{ms}$), PN sequence chip duration ($T_c =1\mu\text{s}$), $E_b/N_0=10$ for average probability of error less than 10^{-5} . Calculate PG and JM.

PART B

5. Discuss various multiple access techniques.
6. Explain the block diagram of rake receiver.
7. (a) Distinguish between Coherence time and Coherence bandwidth
- (b) Explain Antenna Diversity with neat diagram.