APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER M. TECH DEGREE EXAMINATION

Electronics & Communication Engineering

(Telecommunication Engineering)

04EC6805—Advanced Digital Communication

Max. Marks : 60 Duration: 3 Hours

PART A

Answer All Questions

Each question carries 3 marks

1. Draw the signal space diagrams for BPSK, QPSK and PAM?
2. What are antipodal signals? With an example show a signal and it's matched filter in the interval 0<=t<=T.
3. Enumerate the significance of Adaptive Equalization algorithm.
4. Consider a multicarrier system with a total pass band bandwidth of 1 MHz Suppose the system operates in a city with channel delay spread T =20μs. How many sub channels are needed to obtain approximately flat-fading in each sub channel?
5. With an example briefly explain the response of a time- variant multipath channel to an extremely short pulse.
6. What is the condition by which a channel is said to be frequency- selective or non-selective?
7. What do you mean by processing gain and Jamming margin in spread spectrum techniques?
8. Consider an SFH system with hop time $\boldsymbol{Tc}$=10μ sec and symbol time $\boldsymbol{Ts}$= 1 μ sec .If the FH signal is transmitted over a multipath channel, for approximately what range of multipath delay spreads will the received despread signal exhibit frequency-selective fading?

PART B

Each question carries 6 marks

1. Derive the important relations between the correlation functions and power spectra of the equivalent lowpass signal.

OR

2. "The modulator in a digital communication system maps a sequence of binary digits into a set of corresponding signal wave forms". Justify this statement by taking PAM as the modulation method and rate of occurrence of binary digits at input to the modulator as $\boldsymbol{R}$ bits/s.
3. Derive the probability of error expressions for QPSK.

OR

4. Describe a correlation demodulator that decomposes received signal and the noise into N-dimensional vectors.
5. Show that in an ideal channel, the transmitter and receiver filters are jointly designed for zero ISI at the desired sampling instant $t=nT$

OR

6. Write notes on Linear equalization.

7. Explain the significance of PAPR and Frequency and Timing offset in Multicarrier systems.

OR

8. Using mathematical analysis explain the discrete implementation of multicarrier using Cyclic-Prefix method.
9. With mathematical expressions explain Ricean and Nakagami channel models for fading channels

OR

10. Discuss the effect of signal characteristics on the choice of a channel model

11. What is a CDMA signal? Distinguish the performance of CDMA systems with FDMA systems.

OR

12. Write in detail on Spread spectrum principles.