

2062
B.E. (Electronics and Communication Engineering)
Eighth Semester
Elective – II & III
EC-809: Advanced Digital Communication

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) Why we use basis functions to represent any digital modulation technique? (2)
(b) Why we prefer to use low pass equivalent of any pass band signal. (2)
(c) State three properties of Hilbert transform. (2)
(d) Why we prefer to use offset-QPSK rather than standard QPSK technique. (2)
(e) What do you mean by controlled ISI in communication systems? (2)

Part- A

- II. (a) Show that the signal $x(t) = s(t) \cos 2\pi f_c t \pm \hat{s}(t) \sin 2\pi f_c t$ is a single sideband signal. Where $\hat{s}(t)$ is Hilbert transform which is band limited to $B \leq f_c$ Hz? (5)
(b) What are discrete and continuous channel models? Explain its mathematical models. (5)
- III. (a) Represent QPSK signals in signal space and find distance between them. What is the significance of this distance. (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 (a) Prove that variance of the output of correlator is proportional to the power spectral density of noise in AWGN process. (5)
(b) Show that matched filter will acts as optimum receiver for pass band PAM signal. (5)

Part-B

- V. (a) Consider digital transmission method the 8 signals are represented using constellation diagram as shown below. A nearer neighbor signal points are separated by distance of A units. Find the total average power transmitted by transmitter under this scheme. (5)



(2)

(b) Explain in detail with diagram decision directed Maximum Likelihood estimation of timing for base band PAM. (5)

VI. (a) State Nyquist criteria for getting zero ISI. Explain how raised cosine pulse will satisfy this criterion. (5)

(b) Explain an FFT-based multi-carrier communication system in brief. What is the major problem with multi carrier modulation? Describe the various methods investigated to solve it. (5)

VII. (a) What should be the condition on carrier frequency to have energy of orthonormal basis function unity? (5)

(b) Explain time and frequency domain response of OFDM systems. How would we obtain an OFDM symbol? (5)

x-x-x