2123

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) Show that for band-limited channel, maximum data rate is 2B symbols/sec.   (2)

(b) Distinguish between coherent and non coherent communications?   (2)

(c) Why orthogonality among carriers is important in digital communication system.   (2)

(d) Differentiate between orthogonal and bi-orthogonal signals.   (2)

(e) Differentiate between multi-channel and multi-dimensional sigannling.   (2)

Part- A

II. (a) Explain CPM scheme. How it can be converted to CPFSK.   (5)

(b) Calculate power spectral density of rectangular pulse having amplitude A within 0 to T time duration.   (5)

III. (a) Prove that variance of the output of correlator is proportional to the power spectral density of noise in AWGN process.   (5)

(b) Two quadrature carriers $\cos 2\pi f_c t$ and $\sin 2\pi f_c t$ are used to transmit digital information over AWGN channel at two different data rates of 10kbps and 100kbps respectively. Determine relative amplitude of the two carriers such that SNR for the two channels is same.   (5)

IV. (a) Explain optimum receiver for AWGN channel.   (5)

(b) Explain correlation receiver of N correlators with MAP decision rule.   (5)

Part-B

V. (a) How estimation of signal parameters i.e carrier phase and symbol timing is done?   (5)

(b) Explain capacity of CDMA systems. How reverse link capacity is calculated. Derive the equation.   (5)

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

(b) Design OFDM system with following parameters; total delay spread is 300 ns, bit rate is 600Mbps and bandwidth is ≤ 16MHz. **(5)**

VII. (a) The SNR required at the detector to achieve reliable communication in DSSS is 10dB. If the interference power to signal power at the receiver is 23dB. Determine the processing gain recurred to achieve reliable communication. **(5)**

(b) Derive processing gain and jamming margin for DSSS system. **(5)**

x-x-x