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First Semester M.Tech. Degree Examination, Dec.2013/Jan.2014

Advanced Digital Communication

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions.

- 1
 - a. Compare analog transmission versus digital transmission. (06 Marks)
 - b. A scanner has a resolution of 600×600 pixels/sq.inch. How many bits are produced by an 8 inch \times 10 inch image if scanning uses 8 bits/pixel? 24 bits/pixel? (03 Marks)
 - c. What is line coding? Explain in brief different line coding schemes and how are they advantages for digital transmission? (11 Marks)

- 2
 - a. Discuss briefly fundamental limits in digital transmission. (08 Marks)
 - b. Suppose that a low pass communication system has a 1 MHz bandwidth, what bit rate is attainable using 8-level pulses? What is Shannon capacity of this channel if SNR is 20 dB? 40 dB? (04 Marks)
 - c. Differentiate between wired and wireless transmission media. (04 Marks)
 - d. Compare the attenuation in a 100 km link for optical fibers operating at 850 nm, 1300 nm and 1500 nm. (04 Marks)

- 3
 - a. Explain in brief frequency domain and time domain characterization of a communication channel. (10 Marks)
 - b. Discuss error detecting capability of a polynomial code with an example. (10 Marks)

- 4
 - a. Describe discrete memoryless channel. (08 Marks)
 - b. Discuss binary symmetric channel. (04 Marks)
 - c. Explain channel capacity. (08 Marks)

- 5
 - a. With a neat block diagram of a PCM system, explain various signal processing operations. (10 Marks)
 - b. An analog signal is sampled, quantized and encoded into a binary PCM wave. The number of representation levels used is 128. A synchronizing pulse is added at the end of each code word representing a sample of analog signal. The resulting PCM wave is transmitted over a channel of bandwidth 12 kHz using quaternary PAM system with raised cosine spectrum. The roll off factor is unity.
 - i) Find the rate (b/s) at which information is transmitted through the channel.
 - ii) Find the rate at which the analog signal is sampled. What is the maximum possible value for the highest frequency component of the analog signal? (04 Marks)
 - c. Evaluate the statistical characteristics of a quantization noise. (06 Marks)

- 6
 - a. Describe the operation of adaptive differential pulse code modulation with relevant block diagrams. (10 Marks)
 - b. Explain the compression laws, μ law and A law companding. (06 Marks)
 - c. Discuss light wave transmission with fiber optic link. (04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

- 7 a. Explain in brief Nyquist criterion for distortionless baseband binary transmission. (10 Marks)
- b. The binary data stream 011100101 is applied to the input of a modified duo binary coder system.
- i) Construct the modified duo binary coder output and corresponding receiver output without a precoder.
 - ii) Suppose that due to error during transmission, the level produced by the third digit is reduced to zero. Construct new receiver output. (10 Marks)

8 Write short notes on:

- a. Intersymbol interference
- b. Power spectra of NRZ bipolar format
- c. Zero forcing algorithm
- d. The LMA algorithm.

(20 Marks)

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