

A 1142

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2006.

Fifth Semester

Computer Science and Engineering

EC 351 — ANALOG, DIGITAL AND DATA COMMUNICATIONS

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Differentiate between an analog signal and a digital signal.
2. Define modulation depth for a FM system and highlight its impact on the spectral occupation.
3. State the Shannon's theorem and what its significance?
4. What do you understand by orthogonal signals? Explain with an example.
5. What are the major transmission impairments suffered by a signal on a transmission media.
6. What is the major disadvantage of Asynchronous Transmission mode?
7. Draw the Bi-phase and AMI encoded waveforms corresponding to a binary data sequence {0 1 1 0 1 0 0 0 1 1}.
8. Differentiate between Coherent and Non-Coherent detection schemes.
9. List the functions of Data Link Control.
10. What is your understanding of CRC?

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PART B — (5 × 16 = 80 marks)

11. (i) Derive expressions for the quantisation noise and signal-to-noise ratio in a PCM system using a uniform quantiser. (10)
- (ii) A sinusoidal signal is to be transmitted using PCM. An output SNR of 55.8 dB is required. Find the number of representation levels required to achieve this performance. (6)
12. (a) A (15, 5) Linear Cyclic Code has a generator polynomial
- $$g(D) = 1 + D + D^2 + D^4 + D^5 + D^8 + D^{10}$$
- (i) Draw block diagrams of an encoder and syndrome calculator for this code.
- (ii) Find the code polynomial in systematic form, for the message polynomial $m(D) = 1 + D^2 + D^4$.
- (iii) Is $y(D) = 1 + D^4 + D^6 + D^8 + D^{14}$, a code polynomial? If not, find the syndrome of $y(D)$.

Or

- (b) Consider a rate $-1/2$. non-systematic convolutional code with $g^{(1)} = \{1, 0, 1\}$ and $g^{(2)} = \{1, 1, 1\}$.
- (i) Determine the encoder output corresponding to the data sequence $\{1, 0, 1, 0, 1\}$.
- (ii) If the first and the fourth bits of the encoded sequence are affected during transmission, demonstrate the error correcting capability of the Viterbi decoding algorithm.
13. (a) What are the types of errors encountered in Data transmission system. Explain the methods used to overcome the effect of these errors. (4 + 12)

Or

- (b) Write a note on V.24/EIA-232 interface. Draw a timing diagram to show the state of all EIA-232 leads between two DTE and DCE pairs during the communication of a data call in a switched telephone network. (8 + 8)
14. (a) Explain the QPSK modulation scheme with suitable transmitter and receiver block diagrams. Also derive the average probability of error in the presence of AWGN.

Or

- (b) With suitable figures explain a Delta Modulation system. Also discuss the different types of quantisation noise that can arise in the system.

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(a) Explain with suitable diagram and examples, the flow control mechanisms that are used in the process of sending data over a data communication link. (16)

Or

(b) Draw the structure of the HDLC frame and explain in detail the different fields associated with it. (16)

