

B.E./B.TECH (FULL TIME) END SEMESTER EXAMINATIONS, APRIL 2019

ELECTRONICS AND COMMUNICATION ENGINEERING

SEMESTER: V

EC 8502 – DIGITAL COMMUNICATION TECHNIQUES

REGULATIONS: 2012

Time: 3 Hours

Answer ALL Questions

Max. Marks: 100

Part-A (10x2=20 Marks)

1. For a standard voice band communication channel, the SNR is 20 dB and the transmission bandwidth is 10 kHz. What will be the channel capacity?
2. State Nyquist criterion for distortion less baseband transmission.
3. State channel coding theorem.
4. What is meant by recursive systematic encoder?
5. Given the data stream {1 1 0 0}, sketch the transmitted sequence of pulses using the Manchester code.
6. Draw and indicate the eye pattern diagram.
7. Distinguish linear and non linear modulation schemes.
8. List the advantages of MSK over BFSK.
9. What are the advantages of spread spectrum?
10. Enumerate the significance of symbol and frame synchronization.



Part-B (5x16=80 Marks)

11. (i) Derive and explain the information capacity of Gaussian channel. Explain the bandwidth and S/N tradeoff. (10)  
(ii) There are 5 possible messages  $m_1, m_2, m_3, \dots, m_5$  with probabilities  $M = \{0.15, 0.25, 0.1, 0.3, 0.2\}$ . Obtain a binary Huffman code for M. (6)
12. a. Consider the (7,4) cyclic code define by the generator polynomial  $g(x) = 1 + x + x^3$ . Determine the codeword for the message sequence 1001. Suppose the received sequence is 0101011, determine the syndrome and compute the decoded sequence.

(OR)

12. b. The encoder for a rate  $\frac{1}{2}$  convolutional coder is shown in Figure 1. Determine the encoder output produced by the message sequence  $\{1\ 1\ 0\ 0\ 1\}$ . Construct the state diagram and Trellis diagram for the encoder.

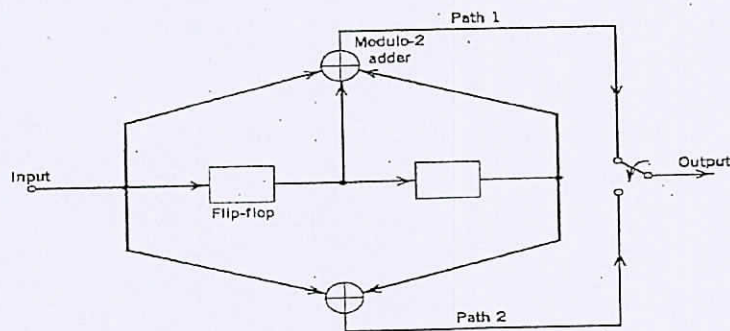


Figure 1

13. a. Determine the Power Spectral Density (PSD) of NRZ Polar signaling scheme. Compare the features of NRZ Bipolar and Manchester signaling schemes.

(OR)

13. b. (i) Derive the Nyquist criterion in time and frequency domain for pulse shaping to realize ISI free transmission. (8)
- (ii) Explain the precoded duobinary signaling scheme and explain the detector for recovering original binary sequence from the coder output. (8)

14. a. With neat sketch, explain the QPSK modulator and demodulator. Determine the probability of error using constellation diagram. Compare the probability of error and spectral efficiency of M-ary PSK schemes.

(OR)

14. b. With neat diagram, explain the DPSK modulator and demodulator. Illustrate the generation and detection of the DPSK signal using the input sequence  $\{1\ 0\ 1\ 1\ 0\}$ .

15. a. With neat block diagram, explain the transmitter and receiver of direct sequence spread BPSK system.

(OR)

15. b. Derive and explain the Maximum Likelihood estimation techniques for unmodulated carrier phase estimation.

