

Reg. No.

Question Paper Code

21329

M.E. / M.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2022

First Semester

M.E. - Communication Systems

20PCOPC102 - ADVANCED DIGITAL COMMUNICATION TECHNIQUES

(Regulations 2020)

Duration: 3 Hours

Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

- | | <i>Marks,
K-Level, CO</i> |
|--|-------------------------------|
| 1. Define BER. What is its significance. | 2,K1,CO1 |
| 2. State the error probability for both coherent and non-coherent signaling. | 2,K1,CO1 |
| 3. List out the characteristics of band limited channels. | 2,K1,CO2 |
| 4. Define Nyquist criterion. What does it signify? | 2,K1,CO2 |
| 5. State single carrier modulation in OFDM. | 2,K1,CO4 |
| 6. Define the term FFT. | 2,K1,CO4 |
| 7. Discuss about the successive interference cancellation. | 2,K1,CO5 |
| 8. Summarize CDMA system in multiuser communications. | 2,K1,CO5 |
| 9. Examine the need of multiuser detection in CDMA systems. | 2,K1,CO6 |
| 10. Illustrate the disadvantages of multicarrier OFDM modulation system. | 2,K1,CO6 |

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

- | | |
|---|----------|
| 11. a) (i) Explain the principle of IQ modulation and demodulation. | 7,K2,CO1 |
| (ii) Summarize the characteristics of Rayleigh channels. | 6,K2,CO1 |

OR

- | | |
|--|-----------|
| b) Examine the performance of M-DPSK receiver with a suitable diagram. | 13,K2,CO1 |
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- | | |
|---|----------|
| 12. a) (i) Differentiate Decision feedback equalizer from zero forcing equalizer. Explain the differences. | 7,K2,CO2 |
| (ii) Trace a neat schematic of an Adaptive equalizer and explain its principle in detail. Bring out its design details. | 6,K2,CO2 |

OR

- | | |
|--|----------|
| b) (i) Derive the minimum mean squared error for zero forcing Decision feedback equalizer. | 7,K2,CO2 |
| (ii) Explain the features of all equalization algorithms, with examples. | 6,K2,CO2 |

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

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13. a) Elaborate about modulation and demodulation in an OFDM systems. *13,K2,CO4*

OR

b) (i) Explain about the parameters required for OFDM system design. *7,K2,CO4*

(ii) Draw the block diagram of OFDM transmitter and receiver. *6,K2,CO4*
Explain them in detail.

14. a) Discuss in detail about optimum and suboptimum detectors in CDMA systems. *13,K2,CO5*

OR

b) Illustrate the performance of bit and power allocation in multicarrier modulation. *13,K2,CO5*

15. a) Illustrate how OFDM concept is emerged in multicarrier modulation Technique. *13,K2,CO6*

OR

b) Trace the block diagram of a multicarrier digital communication and explain its characteristics. *13,K2,CO6*

PART - C (1 × 15 = 15 Marks)

16. a) With an example Explain the following: *15,K3,CO3*

(i) State diagram

(ii) Tree diagram

(iii) Trellis diagram.

OR

b) Consider a (7,4) block code with generator matrix given by *15,K3,CO3*

$$G = \begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & 0 & 1 & 1 \end{bmatrix}$$

(1) The codeword for the message 1 0 1 1.

(2) The parity check matrix.

(3) Syndrome table and prove the error correction capability of the code.