| Reg. No. | | | | | | | | | | | | |
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| Question Paper Code | 12330 |
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**M.E. / M.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2023**

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

| | | *Marks, K-Level, CO* |
|---|---|---|
| 1. | Define BER. What is its significance? | *2,K1,CO1* |
| 2. | Illustrate Rician Channel. | *2,K2,CO1* |
| 3. | What is the significance of eye pattern in communication channels? | *2,K2,CO2* |
| 4. | Examine the causes for ISI. | *2,K2,CO2* |
| 5. | State Shannon's Channel Coding Theorem. | *2,K1,CO3* |
| 6. | When a (n, k) linear block code is called Hamming code? If the minimum hamming distance of a (n, k) linear block code is 3, then what is its minimum Hamming weight. And find out the hamming weight of the codes 101010 and 010101. | *2,K2,CO3* |
| 7. | State maximum likelihood decoding. | *2,K1,CO4* |
| 8. | Differentiate LBC and Convolutional codes. | *2,K2,CO4* |
| 9. | Examine the need of multiuser detection in CDMA systems. | *2,K2,CO5* |
| 10. | What is the purpose of successive interference cancellation? | *2,K2,CO5* |

**PART - B (5 × 13 = 65 Marks)**

Answer ALL Questions

| | | | |
|---|---|---|---|
| 11. | a) | (i) Explain the principle of optimum receiver used in WGN. | *7,K2,CO1* |
| | | (ii) Illustrate the characteristics of Rayleigh channel with a neat diagram. | *6,K2,CO1* |
| | | **OR** | |
| | b) | (i) Explain the principle of IQ modulation and demodulation. | *7,K2,CO1* |
| | | (ii) Summarize the characteristics of Rician channels. | *6,K2,CO1* |
| 12. | a) | (i) Derive the minimum mean squared error for zero forcing Decision feedback equalizer. | *13,K3,CO2* |
| | | **OR** | |

b) Calculate the transfer function and impulse response of duobinary systems which is used to control the ISI with appropriate diagram. *13,K3,CO2*

13. a) State the properties of binary cyclic codes. Derive the polynomial representation of its code vector. *13,K3,CO3*

**OR**

b) Examine the error probability performance for BPSK and Viterbi Algorithm. *13,K3,CO3*

14. a) Examine the key features, merits and demerits of modulation and demodulation in an OFDM system. *13,K3,CO4*

**OR**

b) Elaborate about modulation and demodulation in an OFDM systems *13,K3,CO4*

15. a) Explain
(i) Optimum Multiuser receiver *7,K2,CO5*
(ii) Suboptimum Detection. *6,K2,CO5*

**OR**

b) Develop the concept of multicarrier modulation techniques in OFDM with suitable diagrams. *13,K2,CO5*

## PART - C (1 × 15 = 15 Marks)

16. a) A convolutional encoder has single shift register with two stages three modulo – 2 adders and an output multiplexer. The following generator sequences are combined by the multiplexer to produce the encoder output. g1 = (1, 0, 1), g2= (1 1 0) and g3 = ( 1 1 i) Draw the block diagram of the encoder (ii)For the message sequence(1 0 0 1 1 ) Determine encoded sequence. *15,K3,CO3*

**OR**

b) Differentiate cyclic codes from convolutional codes and Draw a rate ½ convolutional encoder and draw its Trellis diagram representation. Explain them in detail. *15,K3,CO3*