**PVP 20**

Code: 20EC3501

**III B.Tech - I Semester – Regular Examinations - DECEMBER 2022**

# DIGITAL COMMUNICATIONS

## (ELECTRONICS & COMMUNICATION ENGINEERING)

Duration: 3 hours Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.

BL – Blooms Level CO – Course Outcome

| | | | BL | CO | Max. Marks |
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| **UNIT-I** | | | | | |
| 1 | a) | Compare PCM and DM systems applicable to digital communication, consider bandwidth required also. | L2 | CO1 | 7 M |
| | b) | Discuss briefly about Digital line encoding, describe any four factors that should be considered for selecting line encoding format. | L2 | CO1 | 7 M |
| **OR** | | | | | |
| 2 | a) | Explain the Delta Modulation, PCM & Differential PCM, and summarize the differences. | L2 | CO1 | 7 M |
| | b) | (i) Explain Companding with example.<br>(ii) Draw and explain Single-Channel Simplex PCM transmission system. | L2 | CO1 | 7 M |
| **UNIT-II** | | | | | |
| 3 | a) | Discuss why the matched filter is called as an optimum filter, and list its important applications. | L2 | CO1 | 7 M |
| | b) | For a fixed bit-error probability, Interpret the bandwidth, efficiencies and the average transmitted power requirements of BPSK and QPSK schemes. | L3 | CO1 | 7 M |

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| | | **OR** | | | |
| 4 | a) | Explain the importance of digital modulation techniques. Distinguish Non Coherent FSK Detector and Coherent FSK Detector. | L2 | CO2 | 7 M |
| | b) | Compare Binary and Quaternary modulation Techniques M-ary PSK and M-ary FSK with advantages, disadvantages, Constellation diagram, and bandwidth. | L2 | CO1 | 7 M |
| | | **UNIT-III** | | | |
| 5 | a) | Illustrate various aspects of Frequency Hopping Spread Spectrum applicable to digital communications. | L3 | CO2 | 7 M |
| | b) | Write about spread spectrum, explain the importance of the Direct Sequence Spread Spectrum for improving efficient data communication. | L2 | CO1 | 7 M |
| | | **OR** | | | |
| 6 | a) | Illustrate Slow and Fast Frequency Hopping Spread spectrum Techniques applicable for data communications. | L3 | CO2 | 7 M |
| | b) | i) Discuss the applications of Spread Spectrum Techniques.<br>ii) Illustrate about Jamming Margin. | L3 | CO2 | 7 M |
| | | **UNIT-IV** | | | |
| 7 | a) | Consider five symbols given by the probabilities 1/2, 1/4, 1/8, 1/16, 1/16.<br>i) Compute Entropy.<br>ii) Use the Huffman algorithm to develop an efficient source code and calculate the average number of bits/symbol. | L3 | CO2 | 7 M |
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| | b) | Interpret the below for efficient data transfer<br>(i) Shannon-Fano coding.<br>(ii) Huffman coding.<br>(iii) Lempel-Ziv Coding. | L3 | CO3 | 7 M |
| | | **OR** | | | |
| 8 | a) | (i) Illustrate the Channel capacity of a discrete channel.<br>(ii) With help of an example describe Shannon Fano coding. | L3 | CO3 | 7 M |
| | b) | (i) Examine the Properties of Entropy and discuss about Information rate & Source Coding Theorem.<br>(ii) Explain briefly about Lossless Data Compression.<br>Explain about Lempel-Ziv Coding to improve bandwidth & efficiency of communication systems. | L3 | CO3 | 7 M |
| | | **UNIT-V** | | | |
| 9 | a) | Discuss the applications of convolution codes and explain briefly about Encoding of convolutional code with constraint length 2 by using State diagram, Code Tree and Trellis Diagrams. | L2 | CO4 | 7 M |
| | b) | Consider a (7,4) linear block code with generator matrix is given by<br>$\mathbf{G} = \begin{bmatrix} 1\,0\,0\,0 & 1\,0\,1 \\ 0\,1\,0\,0 & 1\,1\,1 \\ 0\,0\,1\,0 & 1\,1\,0 \\ 0\,0\,0\,1 & 0\,1\,1 \end{bmatrix}$<br>i) Generate parity check matrix.<br>ii) Compute minimum distance of the code. | L4 | CO4 | 7 M |
| | | **OR** | | | |

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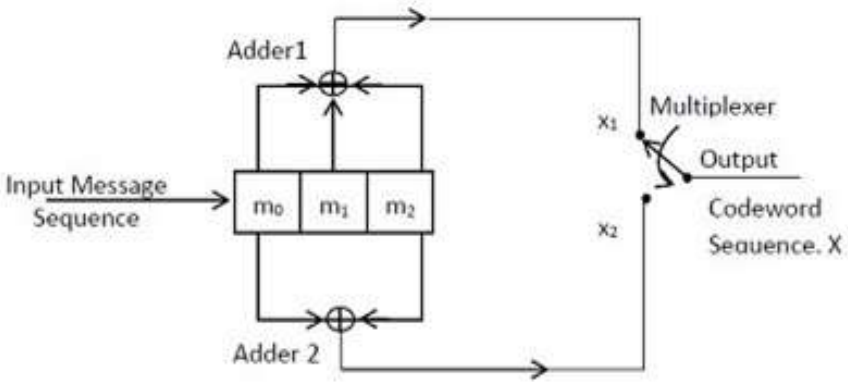
| 10 | a) | Draw the circuit diagram of (7,4) cyclic encoder with generator polynomial $g(p) = 1+p+p^3$. Describe the encoding process of cyclic code and explain it's working. | L3 | CO4 | 7 M |
| | b) | Consider the convolutional encoder shown in figure   Find code word corresponding to the information sequence (11101) using time domain approach. | L4 | CO4 | 7 M |