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| Course Code: | 161EC52 | Course Name | **DIGITAL COMMUNICATION** |
| Course Tutor: |  Sec I :Ms.R.Rajamuthu petchi., AP/ECE Sec II: Mr.G.Lingasamy., AP/ECE |

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**QUESTION BANK**

**UNIT-I - INTRODUCTION AND WAVEFORM CODING TECHNIQUES**

**PART-A**

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| 1. | Define entropy. |  |
| 2. | What is source coding theorem? |  |
| 3. | What is meant by slope over load noise in delta modulation? |  |
| 4. | Find the formula for efficiency of a Huffman code. |  |
| 5. | What is the bandwidth requirement of PCM system? |  |
| 6. | Define discrete memoryless channel. |  |
| 7. | Define channel capacity. |  |
| 8. | What is difference between natural and flat top sampling? |  |
| 9. | List the properties of entropy. |  |
| 10. | Define non-uniform quantization. |  |

**PART-B**

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| 1. | Draw and explain the basic elements of a PCM system?  | (16) |
| 2. | Discuss the Huffman encoding algorithm. | (8) |
| 3. | Explain the Delta modulation transmitter and receiverwith neat block diagram.  | (16) |
| 4. | Explain the instantaneous sampling process with equations both in time and frequency domain. | (8) |
| 5. | A source emits the symbol S={s1,s2,s3,s4,s5} with the probability of P={0.4,0.2,0.2,0.1,0.1}. Find the code words using Huffman coding and evaluate its efficiency. | (8) |
| 6. | Discuss the process of quantization. | (6) |
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**UNIT-II - ERROR CONTROL CODING**

**PART-A**

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| 1. | What is hamming distance? |
| 2. | List the properties of cyclic codes. |
| 3. | How do you confirm the linear block code as hamming code? |
| 4. | What is the need for error control codes? |
| 5. | List the advantages of convolutional codes. |
| 6. | What is meant by systematic and non systematic code? |
| 7. | What is meant by syndrome of linear block code? |
| 8. | Compare between code tree and trellis diagram. |

**PART-B**

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| 1. | Consider a (6, 3) block code and explain how error syndrome helps in correcting a single error for a data 110. | (16) |
| 2. |  Explain the generation of (n, k) block codes and how block codes can be used for error control. | (8) |
| 3. | A parity check code has the parity-check matrixH=$\left[\begin{matrix}1&0&1&1&0&0\\1&1&0&0&1&0\\0&1&1&0&0&1\end{matrix}\right]$a) Determine the generator matrix Gb) Find the code word that begins 101…c) Suppose that the received word is 110110, Decode this received word. | (16) |
| 4. | Find all the code words in a (7,4) linear block code by using the following G matrix and also find the correct code vector when the receiver receives the code vector as(1010110).G=$\left[\begin{matrix}1&1&0&1&0&0&0\\0&1&1&0&1&0&0\\1&1&1&0&0&1&0\\1&0&1&0&0&0&1\end{matrix}\right]$ | (16) |
| 5. | Solve the output of the convolutional encoder, which has the impulse response of g1=(111) and g2=(101). The data inputs are d=1011. | (10) |
| 6. | List the advantages and disadvantages of convolutional encoder. | (6) |
| 7. | Consider a (7, 4) cyclic code with generator polynomial g(x)=1+x+x3. Let data word d=(1010). Find the corresponding systematic code word. | (8) |
| 8. | Evaluate the syndrome for Y=(1001101) for (7,4) cyclic code generated by the polynomial g(x)=x3 +x+1. | (8) |
| 9. | Describe how convolutional codes can be generated with an example. Draw and explain the tree diagram and trellis diagram representation of convolutional codes. | (16) |

**UNIT-III - BASE BAND SHAPING FOR DATA TRANSMISSION**

**PART-A**

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| 1. | What is the principles of correlative coding process? |
| 2. | Mention the use of pre-coder in the duo binary signaling schemes. |
| 3. | Construct the diagram for power spectra of Manchester line codes. |
| 4. | What is ISI? |
| 5. | Draw the eyepattern and label the parts. |
| 6. | Give four applications of eyepattern? |
| 7. | Define correlative level coding process. |
| 8. | List the types of line coding formats. |
| 9. | What are the nyquist criteria for zero ISI transmission? |

**PART-B**

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| 1. | Evaluate the power spectral density for Manchester coding and draw its PSD diagram. | (10) |
| 2. | Analyze the performance measure in eyepattern. | (6) |
| 3. | Explain the modified duobinary signaling scheme. | (10) |
| 4. | Discuss the operation of adaptive equalization. | (6) |
| 5. | Discuss the various waveform of line codes with diagram. | (6) |
| 6. | Develop the power spectral density of uni-polar NRZ line code. | (10) |
| 7. | Develop the power spectral density of Bipolar NRZ line code. | (10) |
| 8. | Explain the process of duo binary signaling scheme | (16) |
| 9. | Discuss and detail about nyquist criterion for distortionless base band binary transmission. | (10) |
| 10. | Derive and explain the power spectral density of1. ON-OFF code
2. Polar code
 | (16) |

**UNIT-IV - DIGITAL MODULATION SCHEMES**

**PART-A**

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| 1. | Construct the constellation diagram for BKSK signal. |
| 2. | What is meant by symbol synchronization? |
| 3. | Compare the probability of error between BPSK and QPSK signal. |
| 4. | Mention the advantages of PSK systems. |
| 5. | Difference between Coherent and Non coherent receivers. |
| 6. | What are the two methods for carrier synchronization? |
| 7. | What is carrier synchronization? |
| 8. | List the advantages of pass band transmission. |

**PART-B**

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| 1. | Elaborate the generation of ASK with necessary diagram. | (16) |
| 2. | Describe coherent and binary FSK modulation. | (16) |
| 3. | Analyze the output waveform, constellation diagram and power spectral density of BPSK signal. | (16) |
| 4. | Discuss the output waveform, constellation diagram, generation and detection, error probability and power spectral density of QPSK signal. | (16) |

**UNIT-V – SPREAD SPECTRUM MODULATION**

**PART-A**

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| 1. | What are the advantages of spread spectrum modulation? |
| 2. | Summarize the properties of Maximum length sequence. |
| 3. | How the length of the PN sequence be calculated? |
| 4. | What are the advantages of DSSS? |
| 5. | Define spread spectrum? |
| 6. | Define processing gain? |

**PART-B**

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| 1. | Develop the PN sequence with the use of shift register. | (10) |
| 2. | Analyze the performance of slow frequency hopped spread spectrum modulation. | (16) |
| 3. | Analyze the transmission and reception of direct sequence spread spectrum modulation | (16) |
| 4. | Explain CDMA system with its features. List out various problems available in CDMA . | (16) |
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