



KINGS



COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SUB.NAME : EC1351 DIGITAL COMMUNICATION TECHNIQUES

BRANCH : ECE

YEAR/SEM: III / VI

UNIT I PULSE MODULATION

PART A (2 Marks)]

1. Define Dirac comb or ideal sampling function. What is its Fourier Transform?
2. Give the interpolation formula for the reconstruction of the original signal $g(t)$ from the sequence of sample values $\{g(n/2W)\}$.
3. State sampling theorem.
4. Define Quadrature sampling.
5. What is aliasing?
6. Give the expression for aliasing error and the bound for aliasing error.
7. What is meant by PCM?
8. Define quantizing process.
9. What is meant by idle channel noise?
10. What is meant by prediction error?
11. Define delta modulation.
12. Define adaptive delta modulation.
13. Name the types of uniform quantizer?
14. What you mean by non-uniform quantization?
15. What is the disadvantage of uniform quantization over the non-uniform quantization?
16. What do you mean by companding? Define compander.
17. Draw the block diagram of compander? Mention the types of companding?
18. What is PAM?

PART B (16 MARKS)

1. a) State and prove sampling theorem. (10)
b) Explain about PAM scheme. (6)
2. a) Define aliasing and derive an expression for it. (10)
b) Explain Adaptive delta modulation system. (6)
3. a) Write short notes on (12)
i) Flat sampling ii) Natural sampling,
iii) Instantaneous sampling.
b) Write short notes on modified Duo Binary scheme. (4)
4. a) Explain in detail the TDM. (8)
b) Explain about the noise in PCM. (8)
5. a) Explain in detail the PCM. (12)
b) Write short notes on Duo Binary signaling scheme. (4)

UNIT II BASEBAND PULSE TRANSMISSION

PART A (2 Marks)

1. How are the predictor coefficients determined?
2. Define adaptive sub band coding?
3. Define Adaptive filter?
4. Define data signaling Rate.
5. Define modulation rate.
6. State Polar format, NRZ unipolar format, NRZ bipolar format, Manchester format, Biphasic.
7. What is an eye pattern?
8. What does the width of the eye define?
9. From the eye pattern how the sensitivity on the system can be determined?
10. What is the margin over noise?
11. What is Inter symbol interference?
12. How an eye pattern is obtained?

PART B (16 MARKS)

1. Explain in detail about the optimum demodulation of Digital signals in the presence of ISI and AWGN.
Also, explain the various equalization techniques. (16)

2. Explain in detail the operation of Non Coherent Receivers in the presence of Random Phase Channel and implement the receiver. (16)
3. Explain in detail the operation of Non Coherent Receivers in the presence of Random amplitude and phase Channel and implement the receiver. (16)
4. a. Explain the In phase and Quadrature Modulation systems. (8)
b. With necessary diagrams explain the operation of Quadrature Amplitude Modulation systems. (8)
5. a. Derive the SNR of the matched filter. (10)
b. Explain the LMS algorithm of adaptive equalization, (6)

UNIT III PASSBAND DATA TRANSMISSION

PART - A (2 Marks)

1. State the properties of matched filter.
2. Define antipodal signals.
3. Explain how QPSK differs from PSK in terms of transmission bandwidth and bit information it carries?
4. Define QPSK.
5. What are the three broad types of synchronization?
6. What is carrier synchronization?
7. What are the two methods for carrier synchronization?
8. What is called symbol or bit synchronization?
9. What are the disadvantages of closed loop bit synchronization?
10. What is called frame synchronization?
11. Why synchronization is required?

PART B (16 MARKS)

1. Explain the Binary Phase Shift Keying and obtain an expression for its probability of error. (16)
2. Explain the Quadrature Phase Shift Keying and obtain an expression for its probability of error. (16)
3. Explain the Minimum Shift Keying and obtain an expression for its probability of error. (16)
4. Explain the Continuous Phase Frequency Shift Keying and obtain an expression for its probability of error. (16)
5. a) Brief about carrier and symbol synchronization. (8)
b) Compare digital modulation systems using single carrier. (8)

UNIT IV ERROR CONTROL CODING

PART - A (2 Marks)

1. What is linear code?
2. What is code rate?
3. Define code efficiency.
4. What is hamming distance?
5. What is meant by systematic & non-systematic code?
6. How syndrome is calculated in Hamming codes and cyclic codes?
7. What is BCH Code?
8. What are the conditions to satisfy the hamming code?
9. Define code word & block length.
10. Give the parameters of RS codes.
11. Why RS codes are called maximum distance separable codes?
12. What are Golay codes?
13. What are the advantages of cyclic codes?

PART B (16 Marks)

1. Draw the code tree of a Convolutional code of code rate $r=1/2$ and Constraint length of $K=3$ starting from the state table and state diagram for an encoder which is commonly used. (16)
2. Draw the trellis diagram of a Convolutional code of code rate $r=1/2$ and Constraint length of $K=3$ starting from the state table and state diagram for an encoder which is commonly used. (16)
3. Decode the given sequence 11 01 01 10 01 of a convolutional code with a code rate of $r=1/2$ and constraint length $K=3$, using viterbi decoding algorithm. (16)
4. Explain the construction of Block Code and how the error syndrome is calculated. (16)
5. Explain in detail about Orthogonal Codes, Biorthogonal Codes and Transorthogonal Codes. (16)

UNIT V SPREAD SPECTRUM MODULATION

Part - A (2 Marks)

1. Define pseudo-noise (PN) sequence.
2. What does the term catastrophic cyclic code represent?
3. Define a random binary sequence.
4. State the balance property of random binary sequence.
5. Mention about the run property.

6. Give the correlation property of random binary sequence.
7. Mention the significance of spread spectrum modulation.
8. What is called processing gain?
9. What is called jamming effect?
10. What is Anti jamming?
11. What are the three codes used for the anti jamming application?
12. What is called frequency hop spread spectrum?
13. What is slow frequency hopping?
14. What is fast frequency hopping?
15. What are the two function of fast frequency hopping?
16. What are the features of Code Division multiple Accesses?
17. What is called multipath Interference?
18. What is the advantage of a spread spectrum technique?
19. What is called frequency hop spread spectrum?
20. What is slow frequency hopping?

PART B (16 Marks)

1. What is Spread Spectrum Techniques? Explain in detail about Direct Sequence Spread Spectrum Techniques with necessary diagrams? (16)
2. What is Frequency Hopping? Explain the different types of frequency hopping with necessary diagrams (16)
3. Explain about maximum length and gold codes. (16)
4. List out and prove the Properties of the PN sequence (16)
5. Explain the concept of DS/BPSK. (16)