

VINAYAKA MISSION'S UNIVERSITY  
V. M. K. V. ENGINEERING COLLEGE, SALEM – 636 308  
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING  
V SEMESTER

DIGITAL COMMUNICATION  
(COMMON TO ECE & ETCE)

QUESTION BANK

UNIT-I

PART-A

1. State sampling theorem
2. Why flat-top sampling is better than natural sampling in PAM system?
3. What is meant by aliasing effect?
4. What is meant by Quantization?
5. What is Prediction filter?
6. What is the principle of TDM?
7. Draw the spectrum of sampled low pass signal.
8. Draw the spectrum of sampled band pass signal.
9. Define mid tread quantizer.
10. Define mid-riser quantizer.
11. Define quantization error.
12. What you mean by non-uniform quantization?
13. List out the disadvantage of uniform quantization over the non-uniform Quantization.
14. What is ISI?
15. State Nyquist criterion for zero ISI.
16. What is eye pattern?
17. What is adaptive equalization?
18. Define Nyquist interval?
19. Define Nyquist rate?
20. State sampling theorem for band pass signal.
21. State sampling theorem for stationary message process.
22. How to Format analog information?

23. List out types of coding format.
24. What are the types of Equalization?
25. What is channel characterization?

**PART-B**

1. State and explain Sampling theorem for low pass signals with spectral diagram.(12)
2. Draw and explain the structure of an adaptive equalization for data Transmission (12)
3. Explain the structure of Tapped delay line filters (12).
4. Describe the formation and application of eye pattern with relevant diagram for a Stream of bits.
5. a. Draw the spectral diagram for ideal Nyquist channel and explain minimum Bandwidth for zero ISI.  
b. explain eye pattern
6. Describe the different types of formats to represent the digital data and list out their merits and demerits with proper illustration.
7. Explain Uniform and non – uniform Quantization with neat diagram.
8. Explain the concept of Detection of binary signals in Gaussian noise.
9. Explain the concept of Matched filter receiver.
10. Explain the concept of maximum likelihood receiver.

**UNIT-II**  
**PART-A**

1. What is the error probability of binary FSK system?
2. What are the different digital modulation techniques?
3. Compare binary PSK and QPSK.
4. Sketch the waveform of PSK for the binary sequence 1 1 0 1 0 0 1.
5. What are the advantages of M-ary signaling scheme?
6. What happens to the probability of M-ary FSK when the value of M-increases?
7. What is meant by correlative coding?
8. Differentiate coherent and non coherent methods.
9. What are antipodal signals?
10. Under what circumstances M-ary signaling schemes are preferred over binary schemes?
11. Compare bandwidth efficiency of M-ary PSK signals & M-ary FSK signals.
12. What is baseband signal receiver?
13. What is matched filter?
14. What is the impulse response of matched filter?
15. What is the value of maximum signal to noise ratio of the matched filter?
16. On what factor error probability of matched filter depends?
17. What is correlation?
18. Which digital modulation technique gives better error probability?
19. What are the advantages of QPSK?
20. What is synchronous detection?
21. What is envelope detection?
22. What is the bandwidth of BPSK signal?
23. What is the bandwidth of QPSK signal?
24. What is the bandwidth of M-ary FSK signal?
25. What is ON-OFF keying technique?

## PART-B

1. a) With neat sketch explain the operation of BFSK modulation.  
b) Derive its probability of error equation.
2. a) Explain the block diagram for generation and reception of ASK along with its waveform.  
b) Derive the probability of error equation for ASK.
3. a) With neat sketch explain the operation of QPSK modulation.  
b) Derive its probability of error equation.
4. a) Explain the block diagram for generation and reception of BPSK along with its waveform.  
b) Derive the probability of error equation for BPSK.
5. Derive the probability of error equation for BPSK and BFSK.
6. Explain the performance of matched filter by obtaining error probability.
7. Write short notes on timing synchronization and carrier synchronization.
8. With neat sketch explain the operation of Non Coherent BFSK modulation.  
b) Derive its probability of error equation
9. a) With neat sketch explain the operation of Non Coherent BPSK modulation.  
b) Derive its probability of error equation.
10. Write short notes on
  - a. ASK
  - b. PSK
  - c. FSK

## UNIT-III

### PART-A

1. What are the three broad types of synchronization?
2. What is carrier synchronization?
3. What are the two methods for carrier synchronization?
4. What is called symbol or bit synchronization?
5. What are the two methods of bit and symbol synchronization?
6. What are the disadvantages of closed loop bit synchronization?
7. What is called frame synchronization?
8. Why synchronization is required?
9. Define phase lock
10. What is data aided synchronizer?
11. Draw the illustration of open loop bit synchronizer?
12. What is bandwidth occupancy?
13. Define symbol lock.
14. What is good synchronization codeword?
15. Write the linearized loop equation.
16. What is the expression for frequency error?
17. What is the expression for time error?
18. What are the probabilities that characterize the performance of a system?
19. Write the steady state tracking equation.
20. What is bandwidth occupancy?
21. What is the expression for frequency error?
22. What is the expression for time error?
23. What is frame marker?
24. What are the levels of synchronization required in non-coherent modulation?
25. What are the CPM signaling techniques?

### PART-B

1. Explain how PLL is used in Receiver Synchronization with neat diagram
2. Explain about Frequency and phase synchronization with neat diagram.
3. Explain about Symbol Synchronization with neat diagram..
4. Explain about Synchronization with continuous phase modulation with neat diagram.
5. Explain about Frame Synchronization with neat diagram.
6. Explain about Network Synchronization with neat diagram.
7. Explain about
  - a. Open loop transmitter Synchronization with neat diagram.
  - b. Closed loop transmitter Synchronization with neat diagram.
8. Explain about
  - a. Suppressed carrier loops
  - b. Costas loop
9. Explain about Data -aided- Synchronization
10. Explain about Non Data -aided- Synchronization

## UNIT IV

### Part – A

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 anti-jamming application?
12. What is meant by 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 multi-path Interference?
- 18.. Mention the advantages of a spread spectrum technique.
19. Compare direct sequence SS and frequency hopping SS.
20. Define acquisition.
21. Define tracking in SS.
22. List out the applications of spread spectrum system.
23. What is the principle of CDMA?
- 24 classify the types of spread spectrum.

25. Draw the circuit diagram to generate (PN) sequence for a length of seven.

### PART – B

1. a) Draw and explain the block diagram of direct sequence spread spectrum transmitter and receiver system.(10)  
b) Mention its merits and demerits of direct sequence spread spectrum (2).
2. a) Draw and explain the block diagram of frequency hop spread spectrum transmitter and receiver system(9).  
b) The direct sequence spread spectrum system has following parameters .Data sequence Bit duration,  $T_b=4.095$  ms,PN chip duration , $T_c = 1\mu\text{s}$ ,  $E_b/N_o=10$  for average Probability of error less than  $10^{-5}$  .Calculate processing gain and jamming margin(3)
- 3.a) Discuss the ways in which fast hopping scheme and slow frequency hopping (Spread spectrum) schemes could be used to mitigate multipath effect(8)  
b) Explain the method of generation of pseudo noise sequence (4)
4. a) State and explain the properties of maximum length sequences(6)  
b) Explain with the block diagram of spread spectrum communication systems(6)
5. a) Explain the performance of direct sequence spread spectrum system (6).  
b) A PN sequence is generated using a feedback shift register of length 4(i.e. 4 stage). Find the generated output if the initial contents of the sequence shift register are 1000.If the chip rate is  $10^7$  chips/sec, calculate the chip and PN sequence duration and period of o/p sequence. Draw its schematic arrangement (6)
- 6.a)With neat sketch describe the principle of CDMA.(8)  
b) Mention the uses of CDMA.
7. Explain the operations of direct sequence SS using BPSK system.(12)
8. Explain the properties of maximum length sequence.(12)
9. Explain performance characteristics of DSSS system.(12)
10. a)Compare direct sequence SS and frequency hopped SS.(6)  
b) Explain various applications of spread spectrum.(6)

**UNIT-V**  
**PART-A**

1. What is the difference between an unconditionally secure cipher and a computationally secure cipher?
2. Briefly define the Caesar cipher.
3. Briefly define the playfair cipher.
4. What is a transposition cipher?
5. What are the two basic functions used in encryption algorithms?
6. What is the difference between a block cipher and a stream cipher?
7. What are the two approaches to attacking a cipher?
8. What is the difference between diffusion and confusion?
9. What is the purpose of the S-boxes in DES?
10. What is the difference between a mono alphabetic cipher and a poly alphabetic cipher?
11. What are the essential ingredients of a symmetric cipher?
12. Define product cipher.
13. Briefly describe the Key Expansion Algorithm.
14. What is triple encryption?
15. List important design considerations for a stream cipher.
16. Differentiate public key encryption and conventional encryption.
17. Specify the application of public key cryptography.
18. What is message authentication?
19. Define the classes of message authentication function.
20. What you meant by MAC?
21. Specify the techniques for distribution of public key.
22. Specify the requirements for message authentication.
23. What are the services provided by PGP services?
24. Name any cryptographic keys used in PGP?
25. Define key Identifier?



## PART-B

1. Explain in detail about the Classical Encryption Techniques.
2. Explain in detail about the DES Algorithm.
3. Explain in detail about the AES Algorithm.
4. Explain in detail about the RSA algorithm.
5. Describe Public Key Cryptography.
6. Explain about PGP services in detail.
7. Explain the concepts of Intrusion Detection.
8. Explain in detail about Authentication Functions.
9. Explain in detail about the functions of Hash Functions
10. Explain Digital Signature Standard.