Question Bank

Analog and Digital Communication

Subject:A&DC | Subject Code:BTEC-501-18

Semester:5th | Examiner:Prof.Karamjit Singh

Unit 1: Analog Communication

2 Marks Questions:

1. Define amplitude modulation.
2. What is the difference between DSB and SSB?
3. What is Vestigial Sideband Modulation (VSB)?
4. Define Frequency Modulation (FM).
5. What is the bandwidth of an FM signal?
6. Write the mathematical expression of an angle modulated signal.
7. What is the significance of the modulation index?
8. What is white noise?
9. Define pre-emphasis and de-emphasis.
10. Mention two advantages of FM over AM.

5 Marks Questions:

1. Compare DSB, SSB, and VSB modulation techniques.
2. Explain the frequency domain representation of AM signals.
3. Describe the principle of FM and PM.
4. Explain the spectral characteristics of FM signals.
5. Describe the process of AM signal detection.
6. Write a short note on angle modulation.
7. Explain the need for modulation in communication systems.
8. Discuss the working of a frequency discriminator.
9. Explain pre-emphasis and de-emphasis with suitable circuits.
10. Explain the effect of white noise on amplitude modulated signals.

10 Marks Questions:

1. Derive the expression for AM wave and explain its transmission and reception.
2. With block diagram, explain generation and detection of SSB signals.
3. Explain in detail FM and PM with their generation techniques.
4. Derive the power relations in amplitude modulated signals.
5. Discuss the effect of noise on AM and FM systems.
6. Explain in detail the working of a Superheterodyne AM receiver.
7. Derive the spectral characteristics of angle modulated signals.
8. Compare AM and FM with respect to bandwidth, noise performance, and efficiency.
9. Explain the role of pre-emphasis and de-emphasis in FM systems.
10. Describe various types of noise affecting analog communication.

✅ Unit 2: Digital Communication

2 Marks Questions:

1. Define sampling theorem.
2. What is quantization?
3. What is Pulse Amplitude Modulation (PAM)?
4. Define Time Division Multiplexing (TDM).
5. What is Pulse Code Modulation (PCM)?
6. What is the purpose of Delta Modulation?
7. Define quantization noise.
8. What is DPCM?
9. List any two advantages of Sigma-Delta Modulation.
10. Mention two types of digital multiplexers.

5 Marks Questions:

1. Explain the concept of sampling and aliasing.
2. Describe the process of Pulse Code Modulation.

3. Compare PCM and DPCM.
4. Explain the need for analog-to-digital conversion.
5. Describe Time Division Multiplexing with example.
6. Explain Delta Modulation and demodulation process.
7. Discuss the role of Adaptive Delta Modulation.
8. Explain quantization noise and how it can be reduced.
9. Write a short note on Sigma-Delta Modulation.
10. Explain the working of Digital Multiplexers.

10 Marks Questions:

1. Explain in detail the process of analog to digital conversion including sampling, quantization and encoding.
2. Derive the expression for signal to noise ratio in PCM.
3. Compare PCM, DPCM, and Delta Modulation in detail.
4. Describe the working of Adaptive Delta Modulation and its advantages.
5. Discuss noise considerations in PCM systems.
6. Explain in detail the PAM, PWM, and PPM schemes.
7. Describe with block diagram the working of Sigma Delta Modulator.
8. Explain the concept of Time Division Multiplexing with suitable example.
9. Explain the quantization process in PCM and the effect of increasing quantization levels.
10. Discuss various methods of modulation used in digital communication.

Unit 3: Elements of Detection Theory

2 Marks Questions:

1. Define detection theory.
2. What is optimum detection?
3. Define Gaussian noise.
4. What is meant by inter-symbol interference?
5. What is Nyquist criterion?

6. Define matched filter.
7. What is the importance of signal-to-noise ratio in detection?
8. Define error probability.
9. What is baseband transmission?
10. State the difference between coherent and non-coherent detection.

5 Marks Questions:

1. Discuss the characteristics of Gaussian noise.
2. Explain the concept of optimum detection of signals in noise.
3. Describe the importance of Nyquist criterion in pulse transmission.
4. Explain matched filter and its significance.
5. Derive the expression for probability of error for binary signaling.
6. Explain inter-symbol interference with diagram.
7. Discuss ISI reduction techniques.
8. Explain baseband pulse transmission system.
9. Compare coherent and non-coherent detection techniques.
10. What are the assumptions in the detection theory?

10 Marks Questions:

1. Derive the expression for probability of error in coherent detection of binary signals.
2. Explain in detail the optimum detection of signals in Gaussian noise.
3. Describe ISI and derive Nyquist criterion for zero ISI.
4. Explain in detail the concept of baseband pulse transmission and its challenges.
5. Discuss the principle and working of a matched filter.
6. Derive the expression for optimum receiver and its performance.
7. Explain the relationship between bandwidth and probability of error.
8. Describe Gaussian random process and its role in communication systems.
9. Discuss signal detection in presence of noise with practical examples.
10. Analyze and derive the performance of coherent and non-coherent receivers.

Unit 4: Digital Modulation Techniques

2 Marks Questions:

1. Define Phase Shift Keying (PSK).
2. What is Frequency Shift Keying (FSK)?
3. What is Quadrature Amplitude Modulation (QAM)?
4. Define Minimum Shift Keying (MSK).
5. What is Binary Phase Shift Keying (BPSK)?
6. List the advantages of PSK.
7. What is Continuous Phase Modulation?
8. What is bandwidth efficiency?
9. Define symbol rate.
10. What is differential PSK?

5 Marks Questions:

1. Explain the working principle of BPSK.
2. Compare ASK, FSK and PSK.
3. Describe the concept of QPSK.
4. Discuss the spectral efficiency of QAM.
5. Explain the generation and detection of FSK.
6. What is Continuous Phase Modulation and where is it used?
7. Write a short note on MSK.
8. Explain the role of carrier recovery in digital modulation.
9. Differentiate between coherent and non-coherent FSK.
10. Describe how bandwidth efficiency is calculated.

10 Marks Questions:

1. Explain the generation and detection of BPSK with block diagram and waveforms.
2. Compare PSK, FSK, and QAM in terms of bandwidth, power efficiency, and applications.

3. Explain QAM in detail with diagram and mathematical representation.
4. Discuss the generation and detection of MSK and its comparison with other schemes.
5. Describe the working of QPSK with constellation diagram.
6. Explain in detail the coherent detection of digital modulation schemes.
7. Derive expression for error probability in PSK systems.
8. Discuss the advantages and limitations of various digital modulation techniques.
9. Explain continuous phase modulation with waveform analysis.
10. Design a digital modulation system using QAM and analyze its performance.