



Subject Name: DISASTER MANAGEMENT

Prepared by (Faculty (s) Name): G PRASANNA LAKSHMI

Year and Sem, Department: III/I ECE

Unit-I: (understanding disasters- hazards and vulnerable)

Important points / Definitions:

- **Risk:** Risk is the possibility or chance of loss, danger or injury.
- **Disaster:** A disaster is a sudden, calamitous event that seriously disrupts the functioning of a community or society and causes human, material, and economic or environmental losses that exceed the community's.
- **disaster risk** is defined as “the potential loss of life, injury, or destroyed or damaged assets which could occur to a system, society or a community in a specific period of time, determined probabilistically as a function of hazard, exposure, and capacity”.
- **Hazard** is any substance, phenomenon or situation, which has the potential to cause disruption or damage to people, their property, their services and their environment.
- **Vulnerability** is a concept which describes factors or constraints of an economic, social, physical or geographic nature, which reduce the ability to prepare for and cope with the impact of hazards.
- **Frequency:** This investigation aims at finding the seasonality of the occurrence of hazards like how frequent and in which seasons which kinds of hazards are expected. For instance Monsoon Rainfall.
- **A vulnerability assessment** is the process of defining, identifying, classifying and prioritizing vulnerabilities in computer systems, applications and network infrastructures and providing the organization doing the assessment with the necessary knowledge, awareness and risk background to understand the threats to its.
- **Natural disasters:** When disasters occur due to natural forces they are called natural disasters, over which man has hardly any control.
- **Man-made disasters:** When the disasters are due to carelessness of human or mishandling of dangerous equipment's they are called man-made disasters.
- **Local disasters:** These are small-scale disasters such as train accidents, plane crashes and shipwrecks



I.SHORT ANSWER QUESTIONS[2M]

1. list different types of environmental disasters? [OCT/NOV 2016]
2. list planetary disaster? [OCT/NOV 2016]
3. what cause of earthquake? [OCT/NOV 2016]
4. Define hazard? [MAY 2016]
5. What is a disaster?
6. Define physical hazards with an example? [MAY 2016]
7. Write a note on environmental hazards?
8. What is risk transfer? [OCT/NOV 2016]

II.LONG ANSWER QUESTIONS [5M]

1. What is earthquake? Explain how earthquake is measured and also the basic terminology involved behind the earthquake and neat sketch? [OCT/NOV 2016]
2. Define vulnerability and discuss the process of vulnerability analysis? [OCT/NOV 2016]
3. Write about levels of disaster and give factors affecting disaster? [OCT/NOV 2016]
4. Define environmental stress. Write a note on the stressors of environment? [MAY 2016]
5. Explain natural and manmade disaster? [MAY 2016]
6. Explain the various types of environmental hazards? [MAY 2016]
7. Explain the different types of man induced disasters effecting the environment?
8. Explain the forewarning levels of different hazards?
9. Write about assessment of Dimensions of vulnerability factor?
10. Explain about Characteristics and damage potential of natural hazard?
11. Describe manmade (anthropogenic disaster) disaster and list out the natural disaster?
12. Explain about frequency and forewarning levels of different hazards?



13. How is environmental hazard linked to ecology? Explain with respect to Drought?
14. What are the environmental impacts of volcanic eruptions? Explain?
15. Write a detailed note on Natural hazard briefly

CHOOSE THE CORRECT ANSWER

1. **Which of the following is not part of geological disaster? [sea surge]**
 - A. Volcanoes
 - B. Earthquakes
 - C. Tsunami
 - D. Sea Surge
2. **What is the rank of India in the world for natural disasters after China as per UNISDR?**
 - A. Third
 - B. Second
 - C. Seventh
 - D. Eighth

Ans: B

3. **Which of the following types of volcanic eruptions associated with Lacroix?**
 - A. Hawaii Eruption
 - B. Strombolian Eruption
 - C. Vulcanian
 - D. All of the above

Ans: D

4. **The volcanic eruption in Iceland falls under which volcanic belt in the World?**
 - A. Belts of Convergent boundaries
 - B. Divergent Plate Boundaries
 - C. Hot Spot
 - D. None of the above

Ans: B



5. A geophysicist who studies earthquakes and the mechanical characteristics of the Earth is called _____.

- A. Seismologist
- B. Geologist
- C. Geographer
- D. Archaeologist

Ans: A

6. What causes Tsunami?

- A. Sudden vertical movement of the Earth
- B. Convergence of destructive plates in the ocean floor
- C. Explosive volcanic eruptions in the seas/oceans.
- D. All of the above

Ans: D

7. Instrument used to measure earthquake is known as

- A. quake meter
- B. quake graph
- C. seismograph
- D. typanicgraph

Answer C

8. What is a tsunami?

- a) a type of fish
- b) a series of huge waves
- c) a kind of volcano
- d) Earthquake

Answer: a series of huge waves

9. What does the acronym ISDR stand for?

- A. International Significant Disaster Resources
- B. International Sustainable Development Report
- C. International Strategy for Disaster Reduction
- D. Intergovernmental Strategy for Developing Recreation

Answer: International Strategy for Disaster Reduction



UNIT 2

IMPORTANT POINTS

1. Error-control coding techniques are used to detect and/or correct errors that occur in the message transmission in a digital communication system.
2. The Hamming (7, 4) code is therefore a single error-correcting and double error-detecting code. More generally, a family of (n, k) linear block codes with parameters

Block length: $n = 2^m - 1$

Number of message bits: $k = 2^m - m - 1$

Number of parity bits: $n - k = m$

3. •

$d_{\min} = 3$

3. Let us consider some blocks of data, which contains **k** bits in each block. These bits are mapped with the blocks which has **n** bits in each block. Here **n** is greater than **k**. The transmitter adds redundant bits which are **(n-k)** bits. The ratio **k/n** is the **code rate**. It is denoted by **r** and the value of **r** is **r < 1**.

The **(n-k)** bits added here, are **parity bits**.

4. While using the hamming codes, extra parity bits are used to identify a single bit error. To get from one-bit pattern to the other, few bits are to be changed in the data. Such number of bits can be termed as **Hamming distance**. If the parity has a distance of 2, one-bit flip can be detected. But this can't be corrected. Also, any two bit flips cannot be detected.

5. The cyclic property of code words is that any cyclic-shift of a code word is also a code word. Cyclic codes follow this cyclic property.

For a linear code **C**, if every code word i.e., **C = (C1, C2, Cn)** from **C** has a cyclic right shift of components, it becomes a code word. This shift of right is equal to **n-1** cyclic left shifts. Hence, it is invariant under any shift. So, the linear code **C**, as it is invariant under any shift, can be called as a **Cyclic code**.

Cyclic codes are used for error correction. They are mainly used to correct double errors and burst errors.

These are the properties of Mutual information.

- Mutual information of a channel is symmetric.

$I(x;y) = I(y;x)$

- Mutual information is non-negative.

$I(x;y) \geq 0$



- Mutual information can be expressed in terms of entropy of the channel output.
$$I(x;y) = H(y) - H(y \mid x)$$
Where $H(y \mid x)$ is a conditional entropy
 - Mutual information of a channel is related to the joint entropy of the channel input and the channel output.
$$I(x;y) = H(x)+H(y) - H(x,y)$$
- 5.
 6. The maximum average mutual information, in an instant of a signaling interval, when transmitted by a discrete memoryless channel, the probabilities of the rate of maximum reliable transmission of data, can be understood as the **channel capacity**.
 7. It is denoted by **C** and is measured in **bits per channel use**.
 8. A source from which the data is being emitted at successive intervals, which is independent of previous values, can be termed as **discrete memoryless source**.
 9. Proof A polynomial $c(x) = c_0 + c_1x + \dots + c_{n-1}x^{n-1}$ represents a code from C if $c(x)h(x) = 0$. For $c(x)h(x) = 0$ the coefficients at x^k, \dots, x^{n-1} must be zero, i.e. $c_0h_k + c_1h_{k-1} + \dots + c_kh_0 = 0$
 $c_1h_k + c_2h_{k-1} + \dots + c_{k+1}h_0 = 0$
 10. 10. Definition (Again!) Let r be a positive integer and let H be an $r \times (2r - 1)$ matrix whose columns are all distinct non-zero vectors of $GF(r)$. Then the code having H as its parity-check matrix is called binary Hamming code denoted by $Ham(r, 2)$.
 11. An (n, k) convolution code (CC) is defined by an $k \times n$ generator matrix, entries of which are polynomials over F_2 . For example, $G_1 = [x^2 + 1, x^2 + x + 1]$
 12. For so-called Additive White Gaussian Noise (AWGN) channels, that well capture deep space channels, this limit is (so-called Shannon-Hartley theorem): $R < W \log_2(1 + S/N)$ Shannon capacity sets a limit to the energy efficiency of the code
 13. 13. **Constraint length**. In **convolutional codes** each output not only depends on the current input but also on previous inputs. The **constraint length** (symbolized by the letter K) is an integer that specifies the "memory" of the **code**.
 14. 14. The **Viterbi algorithm** is the most resource-consuming, but it does the maximum likelihood decoding. It is most often used for decoding convolutional codes with constraint lengths $k \leq 3$, but values up to $k=15$ are used in practice.

SHORT ANSWER QUESTIONS[2M]

1. Derive the Expression for the Information Rate. [MAY 2016]
2. Explain in one sentence about (i) Block Size (ii) Linear block codes. [MAY 2016]
3. List out Properties of Cyclic Codes. [MAY 2016][OCT/NOV 2016]
- 4) Define Entropy[MAY 2016][MAY 2017]
- 5) Define conditional entropy. [MAY 2017]



- 6) Write the advantages of convolution codes [OCT/NOV 2016]
7. Define code rate of block code. [MAY 2017]
8. What is meant by syndrome in linear block code? [MAY 2019]
9. A Discrete Memory less Source X has five equally likely symbols. Construct Huffman code and calculate the efficiency of the code? [MAY 2019]
10. what is meant by systematic and non systematic? [MAY 2018]
11. what is meant by linear block code? [MAY 2018]

II. LONG ANSWER QUESTIONS [5M]

1. Briefly explain about Variable length coding. [MAY 2016]
2. Explain in detail about Huffman coding and Lossy source code. [MAY 2016]
3. Write short notes on Hamming codes. [MAY 2016]
4. Explain about Error detection and Correction capabilities of Hamming codes. [MAY 2016]
5. Explain how Parity checking can be used for error detection or error correction. [MAY 2016]
6. For a linear block code, prove with example that: [MAY 2016]
 - i) The Syndrome depends only on error pattern and not on transmitted code word?
 - ii) All error patterns that differ by a codeword have the same syndrome
7. Explain Huffman coding with an example. [OCT/NOV 2016]
8. Describe the algebraic structure of cyclic codes. [OCT/NOV 2016]
9. Explain how to encode cyclic codes. [OCT/NOV 2016]
10. Give the matrix description for linear block codes. [OCT/NOV 2016]
11. Decode convolution process using viterbi algorithm. [OCT/NOV 2016]
12. Apply Shannon-Fano coding procedure of $M=2$ and $M=3$ $[x]=[x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8]$ with probability $[P]=[1/4, 1/8, 1/16, 1/16, 1/4, 1/16, 1/8, 1/16]$. [MAY 2017]
- 13 Compare code efficiency of Shannon Fano coding and Huffman coding when five source messages have probabilities $m_1=0.4, m_2=0.15, m_3=0.15, m_4=0.15, m_5=0.15$. [MAY 2017]
14. Obtain the probability of bit error for coherently detected BPSK. [5+5] [MAY 2017]



15 We transmit either a 1 or a 0, and add redundancy by repeating the bit. (i) Show that if we transmit 11111 or 00000, then 2 errors can be corrected. (ii) Show that in general if we transmit the same bit $2t+1$ times we can correct up to t errors. [MAY 2017]

16. What are code tree, code trellis and state diagrams for convolution encoders? [MAY 2017]

17. Design the encoder for the (7, 4) cyclic code generated by $G(p)=p^3+p^2+1$ and also verify the operation for any message vector. [MAY 2017]

18. Derive the steps involved in generation of linear block codes. Define and explain the properties of syndrome. [MAY 2017]

CHOOSE THE CORRECT ANSWER

1) Graphical representation of linear block code is known as

- a. Pi graph
- b. Matrix
- c. Tanner graph
- d. None of the above

ANSWER: (c) Tanner graph

2) A linear code

- a. Sum of code words is also a code word
- b. All-zero code word is a code word
- c. Minimum hamming distance between two code words is equal to weight of any non zero code word
- d. All of the above

ANSWER: (d) All of the above

3) For decoding in convolution coding, in a code tree,

- a. Diverge upward when a bit is 0 and diverge downward when the bit is 1
- b. Diverge downward when a bit is 0 and diverge upward when the bit is 1
- c. Diverge left when a bit is 0 and diverge right when the bit is 1
- d. Diverge right when a bit is 0 and diverge left when the bit is 1

ANSWER: (a) Diverge upward when a bit is 0 and diverge downward when the bit is 1

4) The code in convolution coding is generated using

- a. EX-OR logic
- b. AND logic
- c. OR logic
- d. None of the above

ANSWER: (a) EX-OR logic

5) Interleaving process permits a burst of B bits, with l as consecutive code bits and t errors when

- a. $B \leq 2tl$
- b. $B \geq tl$
- c. $B \leq tl/2$
- d. $B \leq t$

ANSWER: (d) $B \leq t$



6) For a (7, 4) block code, 7 is the total number of bits and 4 is the number of

- a. Information bits
- b. Redundant bits
- c. Total bits- information bits
- d. None of the above

ANSWER: (a) Information bits

7) Parity bit coding may not be used for

- a. Error in more than single bit
- b. Which bit is in error
- c. Both a & b
- d. None of the above

ANSWER: (c) Both a & b

8) Parity check bit coding is used for

- a. Error correction
- b. Error detection
- c. Error correction and detection
- d. None of the above

ANSWER: (b) Error detection

9) For hamming distance d_{\min} and t errors in the received word, the condition to be able to correct the errors is

- a. $2t + 1 \leq d_{\min}$
- b. $2t + 2 \leq d_{\min}$
- c. $2t + 1 \leq 2d_{\min}$
- d. Both a and b

ANSWER: (d) Both a and b

10) For hamming distance d_{\min} and number of errors D , the condition for receiving invalid codeword is

- a. $D \leq d_{\min} + 1$
- b. $D \leq d_{\min}^{-1}$
- c. $D \leq 1 - d_{\min}$
- d. $D \leq d_{\min}$

ANSWER:(b) $D \leq d_{\min}^{-1}$

11) Run Length Encoding is used for

- a. Reducing the repeated string of characters
- b. Bit error correction
- c. Correction of error in multiple bits
- d. All of the above

ANSWER: (a) Reducing the repeated string of characters

12) The prefix code is also known as

- a. Instantaneous code
- b. Block code
- c. Convolutional code
- d. Parity bit

ANSWER: (a) Instantaneous code

13) The minimum distance for unextended Golay code is

- a. 8
- b. 9



c. 7

d. 6

ANSWER: (c) 7

14) The Golay code (23,12) is a codeword of length 23 which may correct

a. 2 errors

b. 3 errors

c. 5 errors

d. 8 errors

ANSWER: (b) 3 errors

15) Orthogonality of two codes means

a. The integrated product of two different code words is zero

b. The integrated product of two different code words is one

c. The integrated product of two same code words is zero

d. None of the above

ANSWER: (a) The integrated product of two different code words is zero

UNIT 3(BASE BAND TRANSMISSION)

IMPORTANT POINTS

UNIT 3

ISHORT ANSWER QUESTIONS[2M]

1.List out the Advantages of Pass band Transmission over Baseband transmission. [MAY 2016]

2.What is the need of pulse shaping for optimum transmission in baseband transmission?



Explain. [MAY 2016]

3. What is meant by Cross talk? Explain in detail about the causes for cross talk. [MAY 2016]
4. Define Baseband transmission. [OCT/NOV 2016]
5. Define processing gain and jamming margin [MAY 2017]
6. Explain the generation of PN sequence. [MAY 2017]
7. Write the properties of matched filter . [MAY 2019]
- 8) What is ISI? What are the causes of ISI? [MAY 2019]
9. What is intersymbol interference in baseband binary transmission system? [MAY 2018]
10. What is the necessity of adaptive equalization? [MAY 2018]

II. LONG ANSWER QUESTIONS

- 1 Draw and explain the working of optimum receiver with a neat diagram. [OCT/NOV 2016]
 2. EXPLAIN FSK? Draw the eye diagram of FSK? [OCT/NOV 2016]
 3. Explain crosstalk concept. [OCT/NOV 2016]
 4. What is raised cosine spectrum. Discuss how it helps to avoid ISI. [MAY 2019]
A PAM system has a uniform quantizer followed by a v -bit encoder. Show that the rms SNR is approximately given by $(1.8+6v)$ dB. Assume sinusoidal input. [MAY 2019]
- Or**
- Explain the role of raised cosine spectrum in Nyquist pulse shaping with necessary waveforms and spectra?
- 5.a) Describe Nyquist criterion for distortion less base band transmission.
 - b) A set of signals ($k = 1, 2, 3, 4$) is given by $S_k(t) = \cos(\omega t + k\pi/2)$ $0 \leq t \leq k2\pi/2\omega = 0$ otherwise.
- Use the Gram-Schmidt procedure to find an orthogonal set of functions in which the functions $S_k(t)$ can be expanded. [MAY 2019]
6. Explain how the Residual effects of channel affect ISI? [MAY 2018]
 7. What is Nyquist pulse shaping? [MAY 2018]

CHOOSE THE CORRECT ANSWER

- 1) The interference caused by the adjacent pulses in digital transmission is called
 - a. Inter symbol interference
 - b. White noise
 - c. Image frequency interference
 - d. Transit time noise

ANSWER: (a) Inter symbol interference



- 2) Eye pattern is
- Is used to study ISI
 - May be seen on CRO
 - Resembles the shape of human eye
 - All of the above

ANSWER: (d) All of the above

- 3) The time interval over which the received signal may be sampled without error may be explained by
- Width of eye opening of eye pattern
 - Rate of closure of eye of eye pattern
 - Height of the eye opening of eye pattern
 - All of the above

ANSWER:(a) Width of eye opening of eye pattern

- 04) For a noise to be white Gaussian noise, the optimum filter is known as
- Low pass filter
 - Base band filter
 - Matched filter
 - Bessel filter

ANSWER:(c) Matched filter

- 05) Matched filters are used
- For maximizing signal to noise ratio
 - For signal detection
 - In radar
 - All of the above

ANSWER: (d) All of the above

- 06) The number of bits of data transmitted per second is called
- Data signaling rate
 - Modulation rate
 - Coding
 - None of the above

ANSWER: (a) Data signaling rate

- 07) Pulse shaping is done
- to control Inter Symbol Interference
 - by limiting the bandwidth of transmission
 - after line coding and modulation of signal
 - All of the above

ANSWER: (d) All of the above

- 08) The criterion used for pulse shaping to avoid ISI is
- Nyquist criterion
 - Quantization
 - Sample and hold
 - PLL

ANSWER: (a) Nyquist criterion

- 09) The filter used for pulse shaping is
- Raised – cosine filter
 - Sinc shaped filter
 - Gaussian filter
 - All of the above



ANSWER: (d) All of the above

10) Roll – off factor is defined as

- a. The bandwidth occupied beyond the Nyquist Bandwidth of the filter
- b. The performance of the filter or device
- c. Aliasing effect
- d. None of the above

ANSWER: (a) The bandwidth occupied beyond the Nyquist Bandwidth of the filter

11) Nyquist criterion helps in

- a. Transmitting the signal without ISI
- b. Reduction in transmission bandwidth
- c. Increase in transmission bandwidth
- d. Both a and b

ANSWER: (d) Both a and b

12) The Nyquist theorem is

- a. Relates the conditions in time domain and frequency domain
- b. Helps in quantization
- c. Limits the bandwidth requirement
- d. Both a and c

ANSWER: (d) Both a and c

13) The difficulty in achieving the Nyquist criterion for system design is

- a. There are abrupt transitions obtained at edges of the bands
- b. Bandwidth criterion is not easily achieved
- c. Filters are not available
- d. None of the above

ANSWER: (a) There are abrupt transitions obtained at edges of the bands

14) Equalization in digital communication

- a. Reduces inter symbol interference
- b. Removes distortion caused due to channel
- c. Is done using linear filters
- d. All of the above

ANSWER: (d) All of the above

15) Zero forced equalizers are used for

- a. Reducing ISI to zero
- b. Sampling
- c. Quantization
- d. None of the above

ANSWER: (a) Reducing ISI to zero



Unit 4(DIGITAL MODULATION TECHNIQUES)

IMPORTANT POINTS

- 1.Base band transmission:The digital data is transmitted over channel directly.There is no carrier or any modulation.
- 2.Pass band transmission: The digital data modulates high frequency sinusoidal carrier.Hence it is called CW Modulation.
- 3.Coherent detection(synchronous detection):In this local carrier generated at receiver is phase locked with carrier at transmitter
- 4.Non Coherent detection(Envelope)detection: In this the receiver carrier need not be phase locked with transmitted carrier. but it has high probability of error.



5. Binary phase shift keying : In BPSK binary symbol '1' and '0' modulate the phase of carrier

6. Frequency divider: The signal passed through frequency divider is divided by 2. The output of frequency divider is with frequency f_0 i.e. $\cos(2\pi f_0 t + \theta)$

7. Bit synchronizer and Integrator: The integrator integrates the signal over one bit period. The bit synchronizer takes care of starting and ending times of bit.

8. Bandwidth of BPSK Signal is

$$BW = 2f_b$$

9. Drawbacks of BPSK signal is Ambiguity in output signal

10. Differential phase shift keying: DPSK the input sequence of binary inputs is modified such that next bit depends on previous bit. Therefore in the receiver the previous received bits are used to detect present bit.

11. In BPSK phase of carrier changes on both symbol '1' and '0'. where as in DPSK phase of the carrier changes only on symbol 1.

12. Bandwidth of DPSK Signal

$$BW = f_b$$

13. Advantages of DPSK:

1) DPSK does not require carrier at its receiver. hence complicated circuitry for generation of local carrier is avoided.

2) Bandwidth Requirement of DPSK is reduced compared to that of BPSK.

14. Disadvantages of DPSK:

1) The Probability of error or bit error rate is higher than of BPSK.

2) Since DPSK Uses 2 successive bits for its reception, error in first bit creates error in second bit. hence error propagation in DPSK is more.

3) Noise Interference in DPSK is more.

15. Quadrature phase shift keying: In QPSK, 2 successive bits in data sequence are grouped together. This reduces the bits rate of signaling rate (f_b) and hence reduces bandwidth of channel.

16. Advantages of QPSK:

1) For same bit error rate, the bandwidth required by QPSK is reduced to half as compared to BPSK.

2) Because of reduced bandwidth, the information transmission rate of QPSK is higher.



3) Variations in OQPSK amplitude is not much. Hence carrier power almost remains constant.

17 ASK: The amplitude of Carrier is changed according to binary input signal.

18. FSK: The frequency of carrier is changed according to binary input signal

I. SHORT ANSWER QUESTIONS [2M]

- 1) Draw the Signal space Diagram of ASK. . [MAY 2016]
2. Define QPSK. [OCT/NOV 2016]
3. Draw the block diagram of the PLL. [OCT/NOV 2016]
4. Write the expression for baud rate of BPSK system. [MAY 2017]
5. Explain advantages of coherent digital modulation schemes. [MAY 2017]
6. Sketch the wave form of the FSK signal for the input binary sequence 1100100010. [MAY 2017]
7. Draw PSK and QPSK wave form of bit stream 10001010111. [MAY 2019]
- 8) Compare PSK and QAM. [MAY 2018]
9. Define Ask > [MAY 2018]
10. what is meant by DPSK? [MAY 2018]

II. LONG ANSWER QUESTIONS [5M]

- 1 With neat diagrams and equations, explain about PSK system. [MAY 2016]
2. Draw the space representation of BPSK. And also draw its waveforms? [MAY 2016]
3. The bit stream 1011100011 is to be transmitted using DPSK. Determine the encoded sequence and transmitted phase sequence. [MAY 2016]
4. Explain about DPSK system. And also give the comparison between DPSK and PSK. [MAY 2016]
5. Draw and explain the operating principle of ASK Modulator. [OCT/NOV 2016]
- 6) Describe the BPSK modulation technique with the help of a neat diagram. [OCT/NOV 2016, MAY 2019]

(Or)

Explain BPSK transmitter and receiver with a neat diagram?

- 7 Explain the DPSK modulation technique with the help of a neat sketch. [OCT/NOV 2016]
- 8 Explain the working of non-coherent FSK detector. [OCT/NOV 2016]
9. Derive the bit error probability of a coherent ASK signaling scheme. [MAY 2017/2019]



13. Explain frequency shift keying. Describe coherent detection of FSK signals. What should be the relationship between bit-rate and frequency-shift for a better performance? [MAY 2017]

14 Explain non coherent detection method of binary frequency shift keying scheme. [MAY 2017/2019]

15. Explain coherent detection of PSK signals and derive probability of error. [MAY 2017]

16 .Differentiate coherent and non-coherent detection techniques. [MAY 2017]

17.a) Explain non coherent ASK detector with neat circuit diagram. [MAY 2019]

18. Give a comparison between FSK and PSK schemes? [MAY 2018]

CHOOSE THE CORRECT ANSWER

1. The transmission bandwidth of the raised cosine spectrum is given by

a. $B_t = 2w(1 + \alpha)$

b. $B_t = w(1 + \alpha)$

c. $B_t = 2w(1 + 2\alpha)$

d. $B_t = 2w(2 + \alpha)$

ANSWER: (a) $B_t = 2w(1 + \alpha)$

2) The preferred orthogonalization process for its numerical stability is

a. Gram- Schmidt process

b. House holder transformation

c. Optimization

d. All of the above

ANSWER: (b) House holder transformation

3) For two vectors to be orthonormal, the vectors are also said to be orthogonal. The reverse of the same

a. Is true

b. Is not true

c. Is not predictable

d. None of the above

ANSWER: (b) Is not true

4) Orthonormal set is a set of all vectors that are

a. Mutually orthonormal and are of unit length

b. Mutually orthonormal and of null length

c. Both a & b

d. None of the above

ANSWER: (a) Mutually orthonormal and are of unit length

5) In On-Off keying, the carrier signal is transmitted with signal value '1' and '0' indicates

a. No carrier

b. Half the carrier amplitude

c. Amplitude of modulating signal

d. None of the above

ANSWER: (a) No carrier

6) ASK modulated signal has the bandwidth

a. Same as the bandwidth of baseband signal

b. Half the bandwidth of baseband signal



c. Double the bandwidth of baseband signal

d. None of the above

ANSWER: (a) Same as the bandwidth of baseband signal

7) Coherent detection of binary ASK signal requires

a. Phase synchronization

b. Timing synchronization

c. Amplitude synchronization

d. Both a and b

ANSWER: (d) Both a and b

8) The probability of error of DPSK is _____ than that of BPSK.

a. Higher

b. Lower

c. Same

d. Not predictable

ANSWER: (a) Higher

9) In Binary Phase Shift Keying system, the binary symbols 1 and 0 are represented by carrier with phase shift of

a. $\Pi/2$

b. Π

c. 2Π

d. 0

ANSWER: (b) Π

10) BPSK system modulates at the rate of

a. 1 bit/ symbol

b. 2 bit/ symbol

c. 4 bit/ symbol

d. None of the above

ANSWER: (a) 1 bit/ symbol

11) The BPSK signal has +V volts and -V volts respectively to represent

a. 1 and 0 logic levels

b. 11 and 00 logic levels

c. 10 and 01 logic levels

d. 00 and 11 logic levels

ANSWER: (a) 1 and 0 logic levels

12) The binary waveform used to generate BPSK signal is encoded in

a. Bipolar NRZ format

b. Manchester coding

c. Differential coding

d. None of the above

ANSWER: (a) Bipolar NRZ format

13) The bandwidth of BFSK is _____ than BPSK.

a. Lower

b. Same

c. Higher

d. Not predictable

ANSWER: (c) Higher

14) In Binary FSK, mark and space respectively represent



- a. 1 and 0
- b. 0 and 1
- c. 11 and 00
- d. 00 and 11

ANSWER: (a) 1 and 0

15) The frequency shifts in the BFSK usually lies in the range

- a. 50 to 1000 Hz
- b. 100 to 2000 Hz
- c. 200 to 500 Hz
- d. 500 to 10 Hz

ANSWER: (a) 50 to 1000 Hz

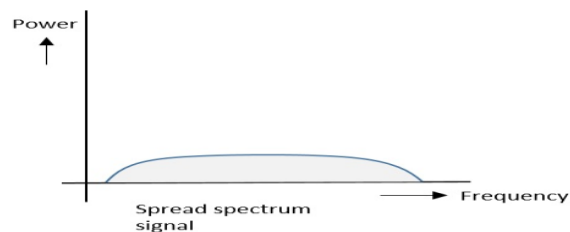
UNIT 5

IMPORTANT POINTS

1. A collective class of signaling techniques are employed before transmitting a signal to provide a secure communication, known as the **Spread Spectrum Modulation**.
2. The main advantage of spread spectrum communication technique is to prevent “interference” whether it is intentional or unintentional.
3. A coded sequence of **1s** and **0s** with certain auto-correlation properties, called as **Pseudo-Noise coding sequence** is used in spread spectrum techniques. It is a maximum-length sequence, which is a type of cyclic code.
4. The spread spectrum signals have the signal strength distributed as shown in the following frequency spectrum figure.

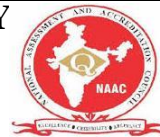


FHSS	DSSS / CDMA
------	-------------



5. This is frequency hopping technique, where the users are made to change the frequencies of usage, from one to another in a specified time interval, hence called as **frequency hopping**. For example, a frequency was allotted to sender 1 for a particular period of time. Now, after a while, sender 1 hops to the other frequency and sender 2 uses the first frequency, which was previously used by sender 1. This is called as **frequency reuse**.

6. Whenever a user wants to send data using this DSSS technique, each and every bit of the user data is multiplied by a secret code, called as **chipping code**.



Multiple frequencies are used	Single frequency is used
Hard to find the user's frequency at any instant of time	User frequency, once allotted is always the same
Frequency reuse is allowed	Frequency reuse is not allowed
Sender need not wait	Sender has to wait if the spectrum is busy
Power strength of the signal is high	Power strength of the signal is low
Stronger and penetrates through the obstacles	It is weaker compared to FHSS
It is never affected by interference	It can be affected by interference
It is cheaper	It is expensive

7.Comparison between FHSS and DSSS/CDMA

10. Advantages of Spread Spectrum

Following are the advantages of spread spectrum –

- Cross-talk elimination
- Better output with data integrity
- Reduced effect of multipath fading
- Better security

SHORT ANSWER QUESTIONS [2M]

- 1) Briefly explain about “Spread spectrum. [MAY 2016]
- 2) What is Frequency hopping spread spectrum? [MAY 2016][MAY 2018]
- 3) List out the applications of CDMA. [OCT/NOV 2016]
- 4) Define spread spectrum. List its uses. [OCT/NOV 2016]
5. A DSSS system has $T_b = 4.095 \text{ ms}$ and $T_c = 1 \mu\text{s}$. Assume the probability of error is not required to exceed 10^{-5} . Find jamming margin. [MAY 2019]
6. If N flip flops are used to generate the PN sequence and T_c is the chip period, what is



the maximum time after which the PN sequence repeats itself? [MAY 2019]

LONG ANSWER QUESTIONS[5M]

1.Explain the role of code division multiple access technique in present generation? [MAY 2016] [OCT/NOV 2016]

2. Give a brief history about direct sequence spread spectrum. [MAY 2016] [OCT/NOV 2016]

[OR]

3Derive the necessity of DSSS techniques. Draw the transmitter and receiver block diagram and explain. [MAY 2017]

4.Explain about PN-Sequences generation and their characteristics. [MAY 2016][OCT/NOV 2016/MAY 2019][may 2018]

5. What is meant by Synchronization? Why we require synchronization in spread spectrum? Explain in detail. [MAY 2016]

6. Describe the concept of Ranging using DSSS. [OCT/NOV 2016]

7. Write a note on CDMA[MAY 2017]

8.Explain the advantages ,disadvantages and applications of spread spectrum modulation. [MAY 2017/ 2019]

9.Discuss the frequency hopping spread spectrum technique in detail. [MAY 2017][MAY 2019]

10.How are spread spectrum signal and interfering signal made transparent to each other. [MAY 2019]

11.How is synchronization achieved in DSSS? [MAY 2019]

12. Write advantages, disadvantages and applications of spread spectrum modulation. [MAY 2019]

13.Draw the block diagram of spread spectrum systems?[MAY 2018]

CHOOSE THE CORRECT ANSWER

1.A pseudorandom code generator is called

- A. hopping
- B. carrier signals
- C. frequency synthesizer
- D. pseudorandom noise
- E. Answer: (d)

2. Technique that uses M different carrier frequencies that are modulated by source signal is called



- A. Multiplexing
- B. Spreading
- C. FHSS
- D. DSSS

Answer: (c)

3. In Frequency Hopping Spread Spectrum (FHSS), sender and receiver can have privacy if hopping period is

- A. short
- B. long
- C. zero
- D. infinity

Answer: (A)

4. IEEE 802.11 Direct Sequence Spread Spectrum (DSSS) uses data rate of

- A. 1 or 2 Mbps
- B. 6 to 54 Mbps
- C. 5.5 and 11 Mbps
- D. 2 and 54 Mbps

Answer: (A)

5. Why spread spectrum technique is inefficient for a single user?

- a) Large transmission bandwidth
- b) Small transmission bandwidth
- c) Fixed transmission bandwidth
- d) Fixed null bandwidth

Answer: (A)

6. Which of the following is not a property of spread spectrum techniques?

- a) Interference rejection capability
- b) Multipath fading
- c) Frequency planning elimination
- d) Multiple user, multiple access interface

Answer: (b)



7. Which of the following is not a characteristic of PN sequence?

- a) Nearly equal number of 0s and 1s
- b) Low correlation between shifted version of sequence
- c) Non deterministic
- d) Low cross-correlation between any two sequences

8. PN sequence can be generated using sequential logic circuits.

- a) True
- b) False

Answer : (A)

9. The period of a PN sequence produced by a linear m stage shift register cannot exceed _____ symbols.

- a) 2^m
- b) m
- c) $2m$
- d) $2^m - 1$

Answer: (d)

10. DSSS system spreads the baseband signal by _____ the baseband pulses with a pseudo noise sequence.

- a) Adding
- b) Subtracting
- c) Multiplying
- d) Dividing

Answer ☹️ C

11. Frequency hopping involves a periodic change of transmission _____

- a) Signal
- b) Frequency
- c) Phase
- d) Amplitude

Answer: (b)

12. What is the set of possible carrier frequencies in FH-SS?

- a) Hopset
- b) Hop



- c) Chips
- d) Symbols

Answer: (C)

13. The bandwidth of the channel used in the hopset is called _____

- a) Hopping bandwidth
- b) Total hopping bandwidth
- c) Instantaneous bandwidth
- d) 3 dB bandwidth

Answer: (c)