MIDTERM EXAMINATION
Spring 2010

Question No: 21   (Marks: 2)

How many types of Bipolar encoding scheme exist?

Answer: (PAGE NO.76)

Bipolar uses three voltage levels.
There are three types of bipolar encoding:
1. AMI (Alternate Mark Inversion)
2. B8ZS
3. HDB3

Question No: 22   (Marks: 2)

Give methods of Analog to Analog conversion.

Answer: (PAGE 95)

Analog Conversion:
Representation of analog information by an analog signal is Analog –to- analog conversion.

Question No: 23   (Marks: 3)

What is frequency spectrum?

Answer: **(PAGE 66)**

Frequency spectrum is the collection of all the components frequencies it contains.

Question No: 24   (Marks: 3)

How bandwidth of a Modem is measured?

Answer: (PAGE 112)

Bandwidth of a modem is not measured in bytes, it is measured in bits. Modem Speed –ASK (full-duplex)
Effective bandwidth of a telephone line is 2400 Hz, the maximum baud rate is also 2400.
Baud rate and bit rate are equal for ASK, so maximum bit rate is also 2400 bps.

Question No: 25   (Marks: 5)

What do you understand by the term DCE? Explain DCE. [5]

Answer: (PAGE 101)
Any device that transmits or receives signal through network is DCE.
It is any functional unit that transmits or receives data in the form of an analog or digital signal through a network.
At the physical layer DCE takes data generated by DTE, converts it to the signal.

Question No: 26   (Marks: 5)

Describe different types of NRZ encoding scheme?

Answer:
In NRZ encoding the level of signal is either positive or negative. NRZ is
classified into 2 types:
NRZ-L NRZ-I

NRZ-L:
Level of the signal depends on the type of bit it represents.
Positive voltage usually means the bit is a 1 and a negative voltage usually means the bit is a 0.

NRZ-I:
The inversion of the level represents a 1 bit. A bit 0 is
represented by no change.

NRZ-I is superior to NRZ-L.**(PAGE 73)**

Question No: 21   (Marks: 2)

Define Sampling Rate.

Answer: (page82)
The accuracy of any digital reproduction of an analog signal depends upon the o. of samples taken

Question No: 22   (Marks: 2)

Write down the types of digital to analog modulation.
Answer: (PAGE 85)

Types of digital to analog modulation
ASK
FSK
PSK
QAM

Question No: 23   (Marks: 3)

What is periodic signal?
Answer: **(page58)**

A signal is called Periodic if it completes a pattern within a measurable time frame called a Period and then repeats that pattern over identical subsequent Periods

Question No: 24   (Marks: 3)

How bandwidth of a Modem is measured?

Answer: (page111)

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Modem Speed –ASK (full-duplex)
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Question No: 25   (Marks: 5)

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Briefly describe Return to Zero (RZ) encoding scheme?

Answer: (page75)

- Any time, data contains long strings of 1's or 0's, Rx can loose its timing
- In unipolar, we have seen a good solution is to send a separate timing signal but this solution is both expensive and full of error
- A better solution is to somehow include synch in encoded signal somewhat similar to what we did in NRZ-I but it should work for both strings of 0 & 1
- One solution is RZ encoding which uses 3 values : Positive, Negative and Zero
- Signal changes not b/w bits but during each bit
- Like NRZ-L , +ve voltage means 1 and a –ve voltage means 0, but unlike NRZ- L, half way through each bit interval, the signal returns to zero
- A 1 bit is represented by positive to zero and a 0 is represented by negative to zero transition
- The only problem with RZ encoding is that it requires two signal changes to encode one bit and therefore occupies more BANDWIDTH
- But of the 3 alternatives we have discussed, it is most effective value.

Question No: 26   (Marks: 5)

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Compare Phase Modulation (PM) with Frequency Modulation (FM)?

Answer: (page 96-97)

Phase modulation (PM)
- Simpler hardware requirements
- Phase is modulated with the amplitude
- Amplitude & Frequency of the carrier signal remain constant

Frequency Modulation (FM)
- Frequency of carrier signal is changed according to the amplitude of modulating signal
- Amplitude and Phase of the carrier signal remain constant

FM Bandwidth
 Bandwidth of FM signal (modulated signal) = 10 * bandwidth of modulating signal Significant spectrum of FM audio = 15 KHz
Minimum 150 KHz bandwidth

Question No: 21   (Marks: 2)

Write down three characteristics of Sine Wave.

Answer :   (page no.59)

- ❖   Amplitude
- ❖   Period/Frequency
- ❖   Phase

Question No: 22   (Marks: 2)

A Sine wave has a frequency of 6 Hz. What is its period?
Answer: (page 61)
F= 6 , t= ?
T = 1/f = 1/6 = 0.17 sec

Question No: 23   (Marks: 3)

Give similarities between 4 QAM & 8 QAM.
Answer: (page 92)
In both case no. of amplitude shifts is more than the no. of phase shifts
Because amplitude changes are susceptible to Noise , number of phase shifts used by QAM is always larger than the amplitude shifts

Question No: 24   (Marks: 3)

What is digital signal? Give an example

Answer: (page 57)
A digital signal is discrete. It can have only a limited number of defined values, often as simple as 1s and 0s
The transition of a digital signal from value to value is instantaneous like a light being switched ON and OFF.

Question No: 25   (Marks: 5)

Difference between Phase Modulation(PM) with Frequency Modulation(FM)?

Answer: (page 96-97)

  Phase modulation (PM)
  - ➢ Simpler hardware requirements
  - ➢ Phase is modulated with the amplitude
  - ➢ Amplitude & Frequency of the carrier signal remain constant

  Frequency Modulation (FM)
  - ➢ Frequency of carrier signal is changed according to the amplitude of modulating signal
  - ➢ Amplitude and Phase of the carrier signal remain constant

FM Bandwidth
Bandwidth of FM signal (modulated signal) = 10 * bandwidth of modulating signal Significant spectrum of FM audio = 15 KHz
Minimum 150 KHz bandwidth

Question No: 26   (Marks: 5)

Write down the criteria or technique that we follow for assigning integral values to sampled signals and also its conversion into binary format. Explain it?

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Question No: 21 (Marks: 2)
How does noise affect FSK?
Answer: (P170)
The duration of the noise is normally longer than the duration of a bit which means that when noise affects data, it affects a set of bits.

Question No: 22 (Marks: 3)
Define Bit interval and Bit rate.

Answer: (P68)
Bit Interval and Bit Rate
 Most digital signals are aperiodic and thus Period and Frequency are not the appropriate terms to describe them

Bit Interval (seconds)
Time required to send one single bit

Bit Rate (bps)
Number of bits sent per second

Question No: 23 (Marks: 5)
Write down the names of layers present in TCP/IP Protocol Suite?

Answer: (P54)
Physical (physical standards)
Data Link (N/w Interface)
Network (Interconnectivity)
Transport (Transport Functions)
Application (Session, Pres, app of OSI)

Question No: 24 (Marks: 10)
The data points of a constellation are at (4,0) and (6,0). Draw the constellation.
Show the amplitude and phase for each point. Is the modulation ASK, PSK, or
QAM? How many bits per baud can one send with this constellation? [10]

Answer:
Hint: 2 amplitudes (4,6) , ASK , bit/baud

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Question No: 21 (Marks: 2)
What is simplex mode of transmission?

Answer:
Communication is Unidirectional
Only one of the two stations can transmit
Other can only receive (P34)

Question No: 22 (Marks: 3)
What is HDB3.

Answer:
Alteration of AMI adopted in Europe and Japan
Introduces changes into AMI, every time four consecutive zeros are encountered instead of waiting for eight zeros as in the case of B8ZS. (P78)

Question No: 23 (Marks: 5)
Write a note on Full duplex mode of transmission.

Answer:
Both stations can transmit and receive simultaneously
Two way street with traffic flowing in both directions at the same time
Signals traveling in either direction share the capacity of the link

The sharing can take place in two ways:
Either the link must contain two physically separate transmission paths:

- ❖ One for sending and
- ❖ One for receiving

Question No: 24 (Marks: 10)
In your view which one is best either B8ZS or HDB3 and why? Write down salient features of both? What is meant by polarity of 1 since the last substitution?

MIDTERM EXAMINATION
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Question No: 21   (Marks: 2)
What is purpose of distributed processing?

Answer:
Multiple computers working on a problem can solve a problem faster than a computer working alone. **(P13)**

Question No: 22   (Marks: 3)
What is HDB3?

Answer:
Alteration of AMI adopted in Europe and Japan
Introduces changes into AMI, every time four consecutive zeros are encountered instead of waiting for eight zeros as in the case of B8ZS. **(P78)**

Question No: 23   (Marks: 5)
Differentiate between the following terms. [10 marks]
   (a) Syntax and Semantics of protocol.

Answer:
Syntax:
Communication between peer entities (P21)
Semantics:
Client/server (P21)

(b) Network management and exchange management.

Answer:
Exchange Management
Error Detection and Correction **(P17)**
Network management (P17)
Security

(c) Monolithic and structured.

Answer: (P21)
Monolithic
Communications is a complex task
To complex for single unit
Structured
Structured design breaks down problem into smaller units
Layered structure

Question No: 24   (Marks: 10)
Differentiate between the following terms. **a)**

Frequency spectrum and bandwidth.

Answer: (P66)

Frequency Spectrum / Bandwidth
Frequency Spectrum: of a signal is the collection of all the component frequencies it contains
It is shown using a Frequency domain graph
Bandwidth: of a signal is the width of the frequency spectrum
In other words, Bandwidth refers to the range of the component frequencies and Frequency Spectrum refers to the elements within that range

(b) **Bandwidth and throughput.**

Answer: (P144)

Measurement of how fast data can pass through a point o In other words, if we consider any point in the TX Medium as a wall through which bits pass, then throughput is the number of bits that can pass this wall in second

(c) Bit interval and bit rate.

Bit Interval and Bit Rate

Most digital signals are aperiodic and thus Period and Frequency are not the appropriate terms to describe them

Bit Interval (seconds)

Time required sending one single bit

Bit Rate (bps)

Number of bits sent per second