



**CS601-Data Communication**  
Latest Solved subjective from Midterm Papers

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Lectures 1-22

Mc100401285

moaaz.pk@gmail.com

Moazz Siddiq

Latest subjectives

**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.

**Muhammad Moazz Siddiq – MCS(4th)**

**moaaz.pk@gmail.com**

**Campus:- Institute of E-Learning & Modern Studies  
(IEMS) Samundari**

**Question No: 25 (Marks: 5)**

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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)**

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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)

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**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?**

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**Muhammad Moaaz Siddiq – MCS(4th)**

**Moaaz.pk@gmail.com**

**Campus:- Institute of E-Learning & Moderen Studies  
(IEMS) Samundari**

**Question No: 25 ( Marks: 5 )**

**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 )**

**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) =  $10 * \text{bandwidth of modulating signal}$  Significant spectrum of FM audio = 15 KHz

Minimum 150 KHz bandwidth

**Muhammad Moaaz Siddiq – MCS(4th)**

**Moaaz.pk@gmail.com**

**Campus:- Institute of E-Learning & Modern Studies  
(IEMS) Samundari**

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**Question No: 21 ( Marks: 2 )**

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**Write down three characteristics of Sine Wave.**

**Answer : (page no.59)**

- ❖ Amplitude
- ❖ Period/Frequency
- ❖ Phase

**Question No: 22 ( Marks: 2 )**

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**A Sine wave has a frequency of 6 Hz. What is its period?**

**Answer: (page 61)**

$F = 6, T = ?$

$T = 1/f = 1/6 = 0.17 \text{ sec}$

**Question No: 23 ( Marks: 3 )**

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**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 )**

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**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)

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**FM Bandwidth**

Bandwidth of FM signal (modulated signal) –  $10 \times$  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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(IEMS) Samundari**