

Department of Electrical Engineering

Assignment

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Course Details

Course Title: Data and computer  
Instructor: Eng. Zulaikha

Module: 6th  
Total Marks: \_\_\_\_\_

Student Details

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## Part A (Objective Type)

- 1) \_\_\_\_\_ is the regulation of the amount of data that can be sent.
- 2) Forty-five physical channels link Ten devices arranged in a mesh topology.
- 3) Signal reflection as the tap can ~~use~~ cause signal degradation BUS topology.
- 4) Session layer allow process to add synchronization point into stream of data.
- 5) If the maximum value of a simple sine wave is 10 volts the minimum value is -10 volts.
- 6) Choose the correct ~~answer~~ association between a device and its functionality.  
Modem Modulation and Demodulation

Fill in the blanks.

- 7) Baud rate is always less than or equal to Bit rate rate
- 8) Stop-and-wait is a Flow technique.
- 9) A TCP connection is uniquely identified by an IP address and a port number.
- 10) An Networking layer of TCP/IP model port address are defined.
- x            x            x            x            x

Part B subject Type

- Q1) In terms of OSI Model please explain the role of shayan, Tariq, Nawaz, and Danish below with proper example.

Sender	Receiver
Andy	Application layer
pervez	Presentation layer
shayan	session layer
Tariq	Transport layer
Nawaz	Network layer
Danish	Data link layer
Paul	physical layer

- 1) At physical layer paul is responsible for movement of individual bits from one half hop (node) to the next i.e Danish.
- 2) After receiving message from paul Danish is responsible for moving of frames from one hop (node) to the next (i.e) Nawaz.
- 3) Nawaz is responsible for the delivery of individual packet from the source host to the destination host i.e Tariq in this example.
- 4) When Tariq receive message from Nawaz, Tariq is responsible for the delivery of a message from one process to another i.e. Shayan.
- 5) Shayan at session layer is responsible for dialog control and synchronization.

B) Data is independent of signal level and it cannot achieve data higher channel capacity.

Ans) Noiseless channel Nyquist Bit Rate.

For a noiseless channel the Nyquist bit rate formula defines the theoretical maximum bit rate.

$$\text{Bit Rate} = 2 \times \text{bandwidth} \times \log_2 L$$

In this formula bandwidth is the bandwidth of the channel  $L$  is the number of signal level used to represent data and Bit Rate is the bit per second.

According to the formula we might think given a specific band width we can have bit rate we want by increasing the number of signal level. Although the idea and level we impose a burden on the receiver if the number of level in a signal as just 2, receiver must be very sophisticated to distinguish between by different level.

In order avoid increasing the level of a signal reduce the reliability of the system.

## \* Noisy channel: Shannon capacity.

In reality, we cannot have a noiseless channel. The channel is always noisy. In 1949, Claude Shannon introduced a formula called the (Shannon capacity) to determine the ~~the~~ theoretical highest data rate for a noisy channel.

$$\text{capacity} = \text{bandwidth} \times \log_2(1 + \text{SNR})$$

In this formula, bandwidth is the bandwidth of the channel, SNR is the signal to noise ratio, and capacity is the capacity of the channel in bits per second. Note that in the Shannon formula, there is no indication of the signal level, which means that no matter how many levels we have, we cannot achieve a data rate higher than the capacity of the channel.

Q2) Some time the ~~sender~~ sender to send information to the ~~receiver~~ receiver but the receiver does not receive the exact information which sender sent to it. How to overcome this problem?

Ans)

Some time the sender sent the information to the ~~sender~~ receiver but the receiver does not receive the exact information due to the following reasons.

- 1) Signal attenuation
  - 2) Signal distortion
  - 3) Noise
- 4) To
- 1) Signal attenuation  
To compensate signal attenuation loss, amplifier are used to amplify the signal.
  - 2) Signal distortion  
To minimize the distortion effect by using error detection and correction schemes.

## 3) Noise

Noise is a spike come from power line lightning etc. using high quality medium for signal like optical fiber etc. can minimize this effect.

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Q3 For transmitting huge amount of data over long distance which type of technique we usually use? Explain with the help of example.

Ans. Higher bandwidth

Fiber optic cable can support dramatically higher bandwidth (and hence data rate) than either twisted pair or coaxial cable. Currently data rate and bandwidth utilization over fiber optic cable are limited not by the medium but by the signal generation and reception technology available.



- \* Less signal attenuation.  
For Fiber optic transmission distance is a significantly greater than that other media. A signal can run for 50 km without rewireing regeneration. We need repeater every 5 km for coaxial or twisted pair cable.
- \* Immunity to electromagnetic interference.  
Electromagnetic noise cannot affect fiber-optic cable.
- \* Resistance to corrosive material.  
Glass is more resistant to corrosive materials than copper.
- \* Light weight.  
Fiber-optic cable are much lighter than copper cables.
- \* Greater immunity to tapping.  
Fiber-optic cable are more immune to tapping than copper cables. Copper cable create antenna effect that can easily be tapped.