FINAL TERM EXAMINATION
SPRING 2011

What is the difference between guided and unguided media?

Answer: Click here for detail

Guided Media are those media that provide a conduit from one device to another. Guided Transmission Media uses a "cabling" system that guides the data signals along a specific path while Unguided Transmission Media consists of a means for the data signals to travel but nothing to guide them along a specific path. It passes through a vacuum; it is independent of a physical pathway.

Write Commercial advantage and characteristics of token bus

Answer: (Page 232)

- Other LANs are not suitable for this purpose
- Token Bus has no commercial application in data communications
- Token Ring allows each station to send one frame per turn
- Access method: Token passing

What is the difference between FDM and TDM

Answer: Click here for detail

1) FDM-Frequency division multiplexing where as TDM mean Time division Multiplexing.
2) In FDM spectrum is divided into frequency whereas in TDM divided into time slot.
3) FDM is used in 1st generation analog system whereas TDM is used in 2nd generation analog system.

Write the types transmission noise

Answer: (Page 143)

Thermal Noise: Due to random originally sent by TX
Induced Noise: Comes from sources like Motors and Appliances
Crosstalk: Effect of one wire on another
Impulse Noise: Spike (A signal with high energy in a very short period of timepower lines, lightening etc.

What is power bandwidth

Answer: Click here for detail

The **power bandwidth** of an amplifier is sometimes taken as the frequency range (or, rarely, the upper frequency limit) for which the rated power output of an amplifier can be maintained (without excessive distortion) to at least *half* of the full rated power.
OR

Power Bandwidth

Answer: (Page 67)

Frequency band in which 99% of the total power resides.

What does the CRC generator append to data unit? [2]

Answer: (Page 175)

Appending it to the end of the data must make the resulting bit sequence exactly divisible by the divisor

How much bandwidth for modem is required in case of FSK? [2]

Answer:

BW required for FSK is equal to the Baud rate of the signal plus the frequency shift. Because of the limitations of voice-grade telephone lines, these modems are restricted to a bandwidth of about 3 kHz

What is even parity generator in VRC error detection mechanism? [2]

Answer: (Page 172)

Even parity generator counts the 1"s and appends the parity bit (1) to the end.

What is the difference between angle of incident and angle of reflection? [2]

Answer: (Page 126)

The difference between them is that Angle of refraction passes from less dense to denser medium whereas angle of incidence passes from more dense to less dense medium.

What is daisy chaining in 1Base 5 star Lan? [2]

Answer: (Page 229)

Slower speed in star lan can be increase by the use of DAISY CHAINING.

What is the responsibility of Application layer? [3]

Answer: Page 53

Enables the user either human or software to access the network

It provides user interface and support for the services such as Electronic mail, Remote File access and Transfer, Shared Database Management and other services

What is critical angle?

Answer: (Page 127)

We have a beam of light moving from a more dense to a less dense medium. We gradually increase the angle of incidence measured from vertical axis. As angle of incidence increases, so does the angle of refraction.

The angle at which refracted line lies on the horizontal axis is called **Critical Angle**

Hamming code-Redundancy bit (5 marks Q)

Answer: (Page 181)

Redundancy Bits (r)

- r must be able to indicate at least m+r+1 states
- m+r+1 states must be discoverable by r bits
- Therefore, $2r \geq m+r+1$

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- If m=7, r=4 as 24 ≥ 7+4+1

Tree topology advantages (3 or 5 marks)

Answer: (Page 31)

- Because of Secondary Hub, More devices can be attached to a Central Hub and therefore increase the distance a signal can travel
- Enables Differentiated Services: Allows to prioritize communication, e.g. computers attached to one secondary hub can be given priority over others
- Therefore, TIME SENSITIVE data will not have to wait for access to the network
- Rest of the advantages are almost the same as STAR

Q #41: Whether VRC error detection method is used for single bit error or burst error. (2)

Answer: (Page 173)

VRC can detect all single bit errors
Can also detect Burst errors as long as the total number of bits changed is ODD

Q # 42: Which modem was first developed commercially in 1970? (2)

Answer: (Page 114)

Bell modems
-First commercial modems by Bell Telephone Co.
-Developed in early 1970s

Q # 45: Consider a major telecom company using RZ encoding for its signals

conversion. What will be the major problem faced by using such type of

encoding? (2)

Answer: (Page 75)

Any time, data contains long strings of 1's or 0's, Rx can loose its timing.
The only problem with RZ encoding is that it requires two signal changes to encode one bit and therefore occupies more BANDWIDTH

Q # 47: Geosynchronous Satellite? (3)

Answer: (Page 139)

- Line of sight propagation requires the sending and receiving antennas must be locked into each other
- To ensure continuous communication, satellites must move with the same speed as earth. So that they seem fixes w.r.t earth
- These satellites are called Geosynchronous Satellites

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FINAL TERM EXAMINATION 2011

Question#1

What are the Asynchronous protocols in data communication layer? .....Marks (10)

Answer: (Page 206)

Asynchronous protocols Treat each character in a Bit stream independently. Employed mainly in Modems.

Transmission does not require timing coordination; Timing is done by using extra bits

Different Asynchronous Protocols

XMODEM

- The first field is a One Byte start of header (SOH) field
- The second field is a two-byte Header.
  - –The first header byte , the Sequence number carries the Frame number
  - –The second header byte is used to check the validity of the sequence number
- The fixed data field holds 128 bytes of data
- The last field CRC checks for errors in the data field only

YMODEM

YMODEM is similar to X-MODEM with only the following major differences:

- 1024-Byte data unit
- Two CANs to abort Transmission
- ITU-T CRC-16 for Error Checking
- Multiple files can be sent simultaneously

ZMODEM :

Newer Protocol

Combines features of XMODEM and YMODEM.

BLAST

- Blocked Asynchronous Transmission
- More powerful than XMODEM
- Full Duplex
- Sliding Window Flow Control
- Allows transfer of Data and Binary Files

KERMIT

- Designed at Columbia University
- Most Widely used Asynchronous Protocol
- File Transfer protocol is similar in operation to XMODEM, with sender waiting for an NAK before it starts TX
- Kermit allows the transmission of control characters as Text

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Question#2

What is Frequency division multiplexing ?.....Marks (5)

Answer: (Page 149)

Frequency division multiplexing (FDM)

- An analog technique that can be applied when BW of the link is greater than the combined BW of the signals to be TX
- Signals generated by each sending device modulate difference carrier frequencies
- These modulated signals are then combined into a single Composite signal that can be transported by the link
- Carrier frequencies are separated by enough BW to accommodate the modulated signal
- These BW ranges are the channels through which the various signals travel

Question#4

What is stop and wait ARQ in error control ?....Marks (3)

Answer: Page 197

Stop-and-Wait is an extended form of flow control to include retransmission of data in case of Lost or Damaged frames.

There are four main features added in it.

1. Sending device keeps a copy of the last frame transmitted until it receives the ACK for that frame.
2. Both data and ACK frames are numbered 0 and 1 alternately.
3. A data 0 frame is acknowledged by a ACK 1 frame indicating that the receiver has received data 0 and is now expecting data 1 .
4. For retransmission to work, 4 features are added to the basic flow control mechanism.

Question#5

What is Interleaving ?.....Marks (3)

Answer: Page 153

Synchronous TDM is considered as a very fast rotating switch. When this switch opens in front of a device, the device has the opportunity to send a specific amount of data on to the path.

The switch moves from device to device at a constant rate and in a fixed order. This process is called INTERLEAVING. Interleaving can be done by BITS, BYTES or by any other DATA UNIT

Question#6

What is DSU in terms of digital services?.....Marks (3)

Answer: Page 163

DSU (Digital service unit) changes the rate of digital data created by the subscriber's device to 56 Kbps and encodes it in the format used by service provider. It used in dialing process and is more expensive than MODEM. But it has better speed, better quality and less susceptibility to noise.

Question#7

Which architecture of Ethernet developed by ITU_T and ANSI?..... Marks (2)

Answer: 236

FDDI (Fiber Distributed Data Interface)architecture of Ethernet developed by ITU_T and ANSI.

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Question#8
What is a spike in noise term?.....Marks (2)
Answer:143
Spike is a signal with high energy in a very short period of time
that comes from power lines, lightening etc,

Question#9
Answer: Page 172
What is even parity generator in VRC error detection mechanism?.....Marks (2)
Even parity generator counts the 1's and appends the parity bit (1) to the end.

Question#10
Compare line discipline methods ENQ/ACK and Poll/ Select?
Answer: Page 188-189
=>ENQ/ACK coordinates which device may start a transmission and whether or not the intended recipient is ready and enabled.
=> Using ENQ/ACK, a session can be initiated by either station on a link as long as both are of equal rank.
=> In both half-duplex and full-duplex transmission, the initiating device establishes the session.
=> In half duplex, the initiator then sends its data while the responder waits. The responder may take over the link when the initiator is finished or has requested a response.
=> In full duplex, both devices can transmit simultaneously once the session has been established.

POLL/SELECT:

=> The poll/select method of line discipline works with topologies where one device is designated as a primary station and the other devices are secondary stations.
=> Multipoint systems must coordinate several nodes, not just two.
=> The primary device controls the link and the secondary device follow sits instruction
It is up to the primary to determine which device is allowed to use the channel data given time

Why addressing is required in Poll / Select method and not required in ENQ/ACK method?3
Answer: (Page 190)
Addressing is required in Poll / Select method as it is a not point-to-point configuration, For the primary device in a multipoint topology to be able to identify and communicate with a specific secondary device, there must be some addressing, while ENQ/ACK method is a point-to-point method and for point-to-point configuration, there is no need for addressing.

What do you know about ITU-T Modems?3
Answer: (Page 114)
ITU-T modem :
V-series: Today's most popular modem standards
Bell modem compatible:
V.21/22/23/26/27/29

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Following abbreviations stands for what?3
Answer: (Page 224)
ARP…… (Address Resolution Protocol)
RARP…….. (Reverse Address Resolution Protocol)
ICMP …… (Internet Control Message Protocol)

Write names of Link Access Protocols developed by ITU-T?3
Answer: (Page 211)
LAPs: LAPB, LAPD, LAPM, LAPZ etc. all based on HDLC

Write the names of different types of noise in the medium?3
Answer: (Page 144)
Thermal Noise
Induced Noise
Crosstalk
Impulse Noise

Write down some disadvantages of star topology.3
Answer: (Page 30)
Although Cabling required is far less than Mesh
Still each node must be connected to a Hub , so Cabling is still much more

What are the two major classes of synchronous protocols at data link layer?2
Answer: (Page 206)
Character – Oriented Protocols
Bit – Oriented Protocols

Whether Hamming code is the technique used for error detection or error correction?2
Answer: (Page 181)
Hamming code is the technique used for error correction

Define Multiplexing? What is its advantage?2
Answer: (Page 147)
Set of techniques that allows the simultaneous transmission of multiple signals across a single data link
It allows multiple users to share total capacity of a Transmission Medium.

What is the purpose of dual ring?2
Answer: (Page 34)
Unidirectional traffic movement is overcome by dual ring technology.

Which modem was first developed commercially in 1970?2
Answer: (Page 114)
Bell modems

Write any two functions of physical layer?2
Answer: (Page 45)

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It defines characteristics of Interface between device and transmission Medium
It also defines the type of transmission medium
Physical Layer is also concerned with Line Configuration

FINAL TERM EXAMINATION
2011

Which one has more overhead, a repeater or a bridge? Explain your answer. [3]
Answer:
A bridge has more overhead than a repeater. A bridge processes the packet at two layers; a repeater processes a frame at only one layer. A bridge needs to search a table and find the forwarding port as well as to regenerate the signal; a repeater only regenerates the signal. In other words, a bridge is also a repeater (and more); a repeater is not a bridge

Define high frequency [HF] and super high frequency [SHF], which devices uses these frequencies [3]
Answer: Page 135 and 136
High frequency.
HF uses ionospheric propagation. These frequencies move into the ionosphere where the density difference reflects them back on earth.
It is used for Citizen's Band Radio, International Broadcasting, Military Communication, Telephone, Telegraph and Fax

Super high frequency.
SHF waves are TX using mostly line-of-sight and some Space propagation.
It is used for Terrestrial and Satellite Microwave and Radar Communication devices.

Write all steps of checksum method. [3]
Answer: (Page 179)
o The sender subdivides data units into equal segments of 'n' bits(16 bits)
o These segments are added together using one's complement
o The total (sum) is then complemented and appended to the end of the original data unit as redundancy bits called CHECKSUM
o The extended data unit is transmitted across the network
o The receiver subdivides data unit as above and adds all segments together and complement the result
o If the intended data unit is intact, total value found by adding the data segments and the checksum field should be zero o If the result is not zero, the packet contains an error & the receiver rejects it

Differentiate internet and the internet? [3]
Answer: (Page 240)
INTERNET
- *An internet* is a generic term used to mean an interconnection of individual networks
- To create an internet, we need networking devices called routers and gateways
- An internet is different from the Internet
- Internet is the name of a specific worldwide network

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What is the differences in between bit oriented and character oriented protocols [5]

Answer: (Page 206)

Character – Oriented Protocols

- Also called **Byte- Oriented Protocol**
- These protocols interpret a transmission frame or packet as a succession of characters, each usually composed of one byte
- All control information is in the form of an existing character encoding system

Bit – Oriented Protocols

- Character –Oriented Protocols are not as efficient as bit – oriented protocols and are seldom used
- They are easy to comprehend and employ the same logic as bit-oriented protocols
- Their study will provide the basis for studying the other data link layer protocols
- IBN's BSC is the best known character oriented protocol

FINAL TERM EXAMINATION
2011

Question#1

What is the formula to calculate the number of redundancy bits required to correct a bit error in a given number of data bits? [2]

Answer: Click here for detail

Messages(frames) consist of m data (message) bits, yielding an n=(m+r)-bit codeword.

Question#2

What is R G rating of coaxial cable?

Answer:- (Page 126)

Different coaxial cable designs are categorized by their Radio government (RG) ratings

Each cable defined by RG rating is adapted for a specialized function:

RG-8

- Used in Thick Ethernet

RG-9

- Used in Thick Ethernet

RG-11

- Used in Thick Ethernet

RG-58

- Used in Thin Ethernet

RG-59

- Used for TV

Question#3

What are the advantages of thin Ethernet?

Answer: (Page 228)

The **advantages** of thin Ethernet are:

1. reduced cost
2. ease of installation

Because the cable is lighter weight and more flexible than that used in Thick net

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Question#4

What is the difference between a unicast, multicast, and broadcast address? [3]

Answer: Click here for detail

Broadcast: transmitting a packet that will be received by every device on the network
Unicast: the sending of information packets to a single destination
Multicast: delivery of information to a group of destinations.

Question#5

T lines are designed for Digital data how they can be used for Analog Transmission?

Answer: (Page 166)

o DS-1 requires 8 Kbps of overhead
o To understand this overhead, let's examine format of a 24-voice channel frame
o Frame used on T-1 line is usually 193 bits divided into 24 slots of 8 bits each + 1 bit for synchronization (24*8+1=193)
o 24 segments are interleaved in one frame
o If a T-1 carries 8000 frames, the data rate is 1.544 Mbps (193 * 8000=1.544 Mbps) which is capacity of the line

Question#6

What are the three types of Guided Media?

Answer: (Page 120)

1. Coaxial cable
2. Twisted-pair cable
3. Fiber optic cable.

Question#7

Why do we need Inverse Multiplexing? [5]

Answer: (Page 159)

- An organization wants to send data, voice and video each of which requires a different data rate
- To send voice it needs 64Kbps,
- To send data, it needs 128 Kbps link
- To send video it may need 1.544 Mbps link
- It can lease a 1.544 Mbps line from a common carrier and only use it fully for sometime
- Or it can lease several separate channels of lower data rates
- Voice can be sent over any of these channels
- Data & Video can be broken into smaller portions using Inverse Multiplexing and TX

Question#8

Describe method of checksum briefly?

Answer: (Page 180)

o The sender subdivides data units into equal segments of 'n' bits(16 bits)
o These segments are added together using one's complement
o The total (sum) is then complemented and appended to the end of the original data unit as redundancy bits called CHECKSUM
o The extended data unit is transmitted across the network
o The receiver subdivides data unit as above and adds all segments together and complement the result
o If the intended data unit is intact, total value found by adding the data segments and the checksum field should be zero o If the result is not zero, the packet contains an error & the receiver rejects it

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Question#9
Explain Asynchronous Time Division Multiplexing in detail? Also discuss its advantages over synchronous TDM?

Answer:

Asynchronous time-division multiplexing (ATDM) is a method of sending information that resembles normal TDM, except that time slots are allocated as needed dynamically rather than pre-assigned to specific transmitters. ATDM is more intelligent and has better bandwidth efficiency than TDM. asynchronous time-division multiplexing comprising receive circuits (CRl/i) supplying cells received via input links, transmit circuits (CTl/j) transmitting retransmitted cells on output links, a buffer memory (MT) storing the received cells and delivering the cells to be retransmitted and a buffer memory addressing device (SMT) including a write address source (SAE) and a read address source (fsl/j).

Advantages asynchronous TDM:
In asynchronous TDM, the timeslots are not fixed. They are assigned dynamically as needed.
The objective would be to switch from one user to another user whenever the one user is idle, and to asynchronously time multiplex the data. With such an arrangement, each user would be granted access to the channel only when he has a message to transmit. This is known as an Asynchronous Time Division Multiplexing System (ATDM). A segment of a typical ATDM data stream is shown in Figure 2. The crucial attributes of such a multiplexing technique are:
1. An address is required for each transmitted message, and
2. Buffering is required to handle the random message arrivals.

FINAL TERM EXAMINATION
2011

Question No: 31 (Marks: 2)
What is hybrid topology?

Answer:

Hybrid topology is a kind of topology, In which Several topologies combined in a larger topology

Question No: 32 (Marks: 2)
What is combined station of HDLC?

Answer: (Page 211)

A combined station is one of a set of connected peer devices programmed to behave either as a primary or as a secondary depending on the nature and the direction of the transmission.

Question No: 33 (Marks: 2)
What kind of error is undetectable by the checksum?

Answer: (Page 180)

Error is invisible if a bit inversion is balanced by an opposite bit inversion in the corresponding digit of another segment

Question No: 34 (Marks: 2)
What's the name of the telephone service in which there is no need of dialing?

Answer: (Page 161)

In Analog Leased Service there is no need of dialing

Question No: 35 (Marks: 3)
How Bit Rate & Baud rate are related?
Answer: (Page 85)
Bit rate equals the baud rate times the no. of bits represented by each signal unit.
The baud rate equals the bit rate divided by the no. of bits represented by each signal shift.
Bit rate is always greater than or equal to Baud rate

Question No: 36 (Marks: 3)
Following abbreviations stands for what?
Answer: (Page244)

1. ARP: Address Resolution Protocol
2. RARP: Reverse Address Resolution Protocol
3. ICMP: Internet Control Message Protocol

Question No: 37 (Marks: 3)
Differentiate between Polling and Selecting.
Answer: (Page 189)
If the primary wants to receive data, it asks the second-arise if they have anything to send, This is called Polling
If the primary wants to send data, it tells the target secondary to get ready to receive, This function is called Selecting.

Question No: 38 (Marks: 3)
T lines are designed for Digital data how they can be used for Analog Transmission?
Answer: repeat

Question No: 39 (Marks: 5)
What is the difference between character oriented and bit oriented protocols?
Answer: repeat

Question No: 40 (Marks: 5)
Write down the function of Primary-Secondary communication in line discipline.
Answer: (Page 189)

1. Poll method works with topologies where one device is designed as a Primary station and the other devices are Secondary stations
2. The primary device controls the link and the secondary device follow sits instruction
3. **It** is up to the primary to determine which device is allowed to use the channel at a given time.
4. The primary therefore is always the initiator of the a session
5. Whenever a multipoint link consists of a primary device and multiple secondary devices using a single TX line , all exchanges must be made through the primary device even when the ultimate destination is a secondary device