Question Number 1

1) Interactive transmission of data independent of a time sharing system may be best suited to
   (a) simplex lines (b) half-duplex lines (c) full-duplex lines (d) biflex lines

2) The loss in the signal power as of an Electromagnetic signal is called
   (a) attenuation (b) propagation (c) scattering (d) interruption

3) Early detection of packet losses improves _____ acknowledgment performance.
   (a) odd (b) even (c) positive (d) negative

4) Additional signal introduced in the desired signal in producing hypes is called
   (a) fading (b) noise
   (c) scattering (d) dispersion

5) Token is a **_____Protocol_____** that rotates around the ring.

6) Ring may have up to **_____250_____** (802.5) or **_____260_____** (IBM) nodes.

7) FDDI can support a maximum of **_____500_____** stations.

8) Error-correcting codes are **____intelligent _____** enough to handle all errors.

9) ACK is a small **_____Control frame_____** confirming reception of an earlier frame

10) Electronics are **_____Organized_____** as compared to optics

Question Number 2:

Error Detection

- The receiver receives 011 which is a valid code word. The receiver extracts the data word 01 from it.
- The code word is corrupted during transmission, and 111 are received. This is not a valid code word and is discarded.
- The code word is corrupted during transmission, and 000 is received. This is a valid code word. The receiver incorrectly extracts the data word 00. Two corrupted bits have made the error undetectable.

Data Word	Code Word
00	000
01	011
10	101
11	110

Error correction:

- The sender creates the code word 01011.
- The code word is corrupted during transmission, and 01001 are received.
- Receiver finds an error has occurred, assuming that there is only 1 bit corrupted .
- Comparing the received code word with the 1st code word in the table (01001 versus 00000), the receiver decides that the 1st code word is not the one that was sent because there are 2 different bits. (the same for 3rd or 4th one in the table)
- The original code word must be the 2nd one in the table because this is the only one that differs from the received code word by 1 bit.

Data Word	Code Word
00	00000
01	01011
10	10101
11	11110

Error Detection Technique

1) Checksum:

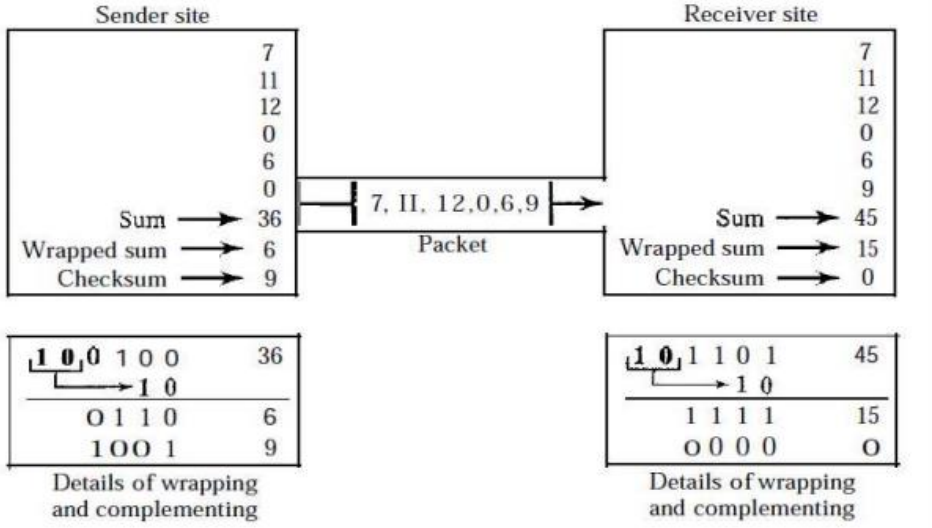
Checksum • (7, 11, 12, 0, 6), we send (7, 11, 12,0,6,36), where 36 is the sum of the original numbers .

• We send the negative (complement) of the sum, called the checksum. In this case, we send (7, 11, 12,0,6,-36).

• Complement of "x" = (2^n – 1) –x : n bit's

Checksum: Example

• The sender initializes the checksum to 0 and adds all data items and the checksum. However, 36 cannot be expressed in 4 bits. The extra two bits are wrapped and added with the sum to create the wrapped sum value 6. The sum is then complemented, resulting in the checksum value 9 (15 − 6 = 9).



2) Parity Checking

Parity bit means nothing but an additional bit added to the data at the transmitter before transmitting the data. Before adding the parity bit, number of 1's or zeros is calculated in the data. Based on this calculation of data an extra bit is added to the actual information / data. The addition of parity bit to the data will result in the change of data string size.
This means if we have an 8 bit data, then after adding a parity bit to the data binary string it will become a 9 bit binary data string.
Parity check is also called as "Vertical Redundancy Check (VRC)".
There is two types of parity bits in error detection, they are

- Even parity
- Odd parity

Even Parity

- If the data has even number of 1's, the parity bit is 0. Ex: data is 10000001 -> parity bit 0
- Odd number of 1's, the parity bit is 1. Ex: data is 10010001 -> parity bit 1

Odd Parity

- If the data has odd number of 1's, the parity bit is 0. Ex: data is 10011101 -> parity bit 0
- Even number of 1's, the parity bit is 1. Ex: data is 10010101 -> parity bit 1

3 bit data			Message with even parity		Message with odd parity	
A	B	C	Message	Parity	Message	Parity
0	0	0	000	0	000	1
0	0	1	001	1	001	0
0	1	0	010	1	010	0
0	1	1	011	0	011	1
1	0	0	100	1	100	0
1	0	1	101	0	101	1
1	1	0	110	0	110	1
1	1	1	111	1	111	0

Question Number 3:

Encoding:

Encoding is the process of converting data into a format required for a number of information processing needs, including:

- Program compiling and execution
- Data transmission, storage and compression/decompression
- Application data processing, such as file conversion

Encoding can have two meanings:

- In computer technology, encoding is the process of applying a specific code, such as letters, symbols and numbers, to data for conversion into an equivalent cipher.
- In electronics, encoding refers to analog to digital conversion.

Types of Encoding

The four primary types of encoding are visual, acoustic, elaborative, and semantic.

Visual

Visual encoding is the process of encoding images and visual sensory information. The creation of mental pictures is one way people use visual encoding. This type of information is temporarily stored in iconic memory, and then is moved to long-term memory for storage. The amygdala plays a large role in the visual encoding of memories.

Acoustic

Acoustic encoding is the use of auditory stimuli or hearing to implant memories. This is aided by what is known as the phonological loop. The phonological loop is a process by which sounds are sub-vocally rehearsed (or “said in your mind over and over”) in order to be remembered.

Elaborative

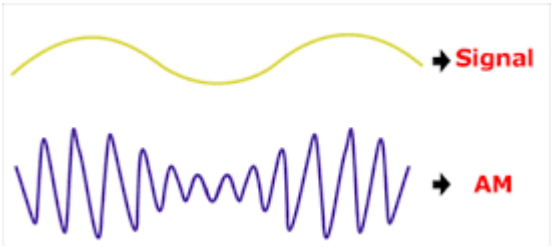
Elaborative encoding uses information that is already known and relates it to the new information being experienced. The nature of a new memory becomes dependent as much on previous information as it does on the new information. Studies have shown that the long-term retention of information is greatly improved through the use of elaborative encoding.

Semantic

Semantic encoding involves the use of sensory input that has a specific meaning or can be applied to a context. Chunking and mnemonics (discussed below) aid in semantic encoding; sometimes, deep processing and optimal retrieval occurs. For example, you might remember a particular phone number based on a person’s name or a particular food by its color.

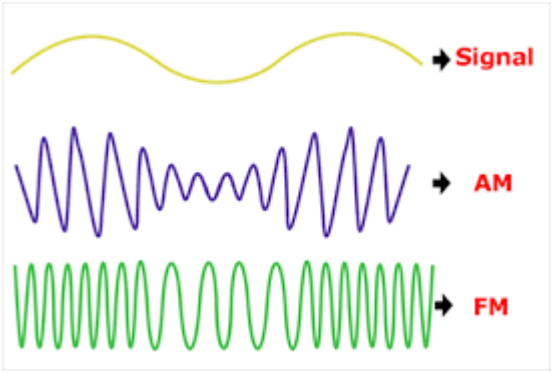
AM: Amplitude Modulation

In **amplitude modulation**, the amplitude of the carrier wave is varied in proportion to the message signal, and the other factors like frequency and phase remain constant. The modulated signal is shown in the below figure, and its spectrum consists of lower frequency band, upper frequency band and carrier frequency components. This type of modulation requires greater band width, more power. Filtering is very difficult in this modulation.



Frequency modulation

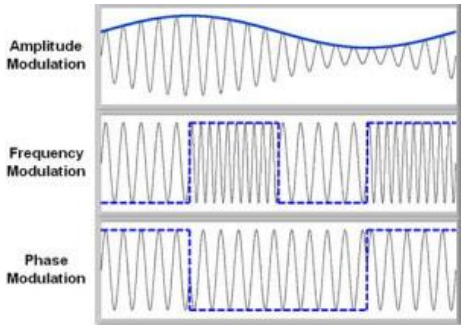
Frequency modulation (FM) varies the frequency of the carrier in proportion to the message or data signal while maintaining other parameters constant. The advantage of FM over AM is the greater suppression of noise at the expense of bandwidth in FM. It is used in applications like radio, radar, telemetry seismic prospecting, and so on. The efficiency and bandwidths depend on modulation index and maximum modulating frequency.



Phase modulation

In **phase modulation**, the carrier phase is varied in accordance with the data signal. In this type of modulation, when the phase is changed it also affects the frequency, so this modulation also comes under frequency modulation.

Analog modulation (AM, FM and PM) is more sensitive to noise. If noise enters into a system, it persists and gets carried till the end receiver. Therefore, this drawback can be overcome by the



Question 4:

Ethernet:

Ethernet is a main part of computer networking technologies for Local Area Networks (LANs) and Metropolitan Area Networks (MANs).

Ethernet supports a direct cable connection.

Ethernet competed with two largely proprietary systems, token ring and token bus.

Because Ethernet is able to adopt twisted pair wiring.

Token Ring:

In token ring, each node contains a repeater that receives bits from one of the two links and transmits them on the other.

It receives messages by copying bits as they pass by.

Every token ring network is built in a star topology.

The network is physically wired with all nodes connecting to a device called a Multi station Access Unit (MSAU) in a star topology.

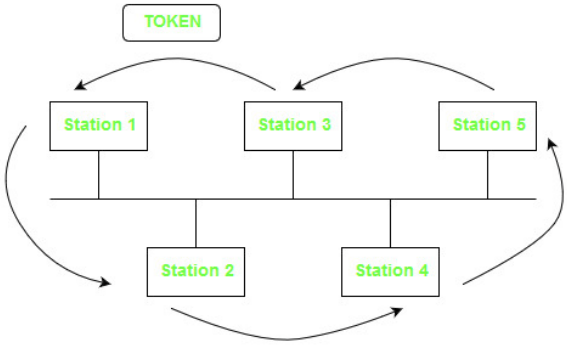
It provides a priority system that allow administrator to designate specific stations.

Multiple identical MAC addresses are supported on Token ring.

A token passing is a Media Access Control, or MAC protocol which determines how stations transmit data to the network.

MAC is a very low level protocol built into every token ring device and operates automatically, with no user setup required.

Token ring doesn't support a direct cable connection as it requires additional hardware and software to operate on a direct cable connection setup.



Ethernet is better:

In **Token ring** The local area network which has the properties to transmit the node only and **Ethernet** The system used for connecting various computers to form a local area network and has different protocols to ensure the passage of information takes place smoothly.

Token ring working Deterministic **Ethernet** working non- Deterministic.

A **Token-passing** system which has only one workstation to call upon at one instant.

Ethernet Collision Sense Multiple Access/Collision Detection (CSMA/CD) topology.

Question Number 5.

Paper Name: New approach of multi-path reliable transmission for marginal wireless sensor network

In the application environment having dense distribution of marginal wireless sensor network (WSN), the data transmission process will generate a large number of conflicts, which will result in loss of transmission data and increase of transmission delay. The multi-path data transmission method can effectively solve the problem of large data loss and transmission delay caused by collisions. A new approach of multi-path reliable transmission for application of marginal WSN (named RCB-MRT) is proposed in this paper. It adopts redundancy mechanism to realize the reliability of data transmission, and uses concurrent woven multi-path technology to improve the transmission efficiency of data packets. Firstly, it divides the data packets that the sensor node needs to transmit into several sub-packets with data redundancy, and then forwards the sub-packets to the aggregation node through multi-path by the intermediate nodes of marginal environment.

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