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CSE-2
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CN Sessional Paper

Q1-a) explain the difference b/w an Internet draft and proposed standard?

Internet draft is a working document (a work in progress) with no official status and a 6 month lifetime. Upon recommendation from the Internet authorities, a draft maybe published as a Request for comment (RFC).

Proposed standard is a specification that is stable, well understood and of sufficient interest to the Internet community. At this level, it is usually tested and implemented by several d/f groups.

b) explain the factors that determine whether the communication system is LAN or WAN?

Factors		LAN	WAN
1)	size	less than 2m	worldwide
2)	speed	higher than WAN	slower than LAN
3)	ownership	private ~~public~~	private / public
4)	congestion	less	more
5)	propagation delay	short	long
6)	Transmission media	coaxial / UTP	PSTN / satellite link

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(c) In a ring topology, what happens if one station is unplugged?

Since the flow of data in ring topology is unidirectional so if one station is unplugged, it disables the entire network and the ring can stop functioning.

(d) Differentiate b/w guided and unguided transmission media?

	guided	Unguided
1)	The signal energy propagates through wires.	The signal energy propagates through air.
2)	It is used for point to point communication	It is suited for radio broadcasting in all directions.
3)	Signals are in the form of voltage, current or photons	Signals are in the form of electromagnetic waves.
4)	Discrete n/w topolies are formed by guided media.	Continuous n/w topologies are formed by the unguided media.
5)	Ex -: twisted pair cable, coaxial, fibre optic	Ex-: microwave / radio links or infrared light.

(e) what is character stuffing?

Data link layer divides the stream of data from physical layer into frames. In order to mark the end of frame, a special flag byte is used but if it matches the message pattern, it leads to ambiguity.

To prevent this a special byte called as escape character is stuffed before every byte with same pattern as the flag.

Q2-a) If the frame is 110101011 and the generator is $x^4 + x + 1$ what would be the transmitted frame generated by CRC.

Divisor = 10011

Dividend = 110101011

```
                    1100000010101
        10011 ⟌ 110101011 00000
                100111
                010011
                100111
                0000001100
                    00000
                    11000
                    -10011
                    001010
                    -10011
                    01110
                    10011
                    11110
```

Ans → 1 1 0 0 1 1

```
           10011 ) 1 1 0 1 0 1 0 1 1
                   1 0 0 1 1 ↓
                   ─────────
                   0 1 0 0 1 1
                     1 0 0 1 1 ↓
                     ─────────
                     0 0 0 0 0 0
                       0 0 0 0 0 ↓
                       ─────────
                       0 0 0 0 1
                         1 0 0 1 1 ↓
                         ─────────
                         1 0 0 1 0 1
                           1 0 0 1 1
                           ─────────
                           1 0 1 1 0
                             1 0 0 1 1
                             ─────────
                             0 0 1 0 1
```

Ans → ~~1 1 0 0 1 1~~ 1 1 0 1 0 1 0 1 1 0 1 0 1

Q 2-b) How does a single bit error differ from burst error?

Bit error means only a single bit is changed from 0 to 1 or vice-versa. There is error only in a single bit.

Burst error means 2 or more bits can contain errors.

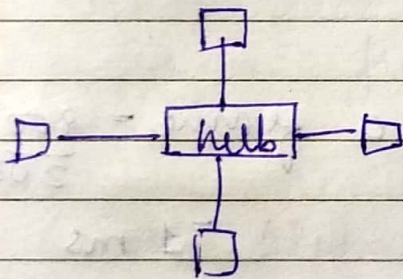**Q2-(c)** Differentiate b/w Stare & tree topology?

Star	Tree
1) Nodes are connected to central node known as hub	every node is connected to its left and right side nodes
2) Cost is high	Cost is low
3) Only hub is a failure point.	~~only~~ every node is a failure point.
4) Data moves from node to hub then from hub to destination node.	Data moves only in one direction
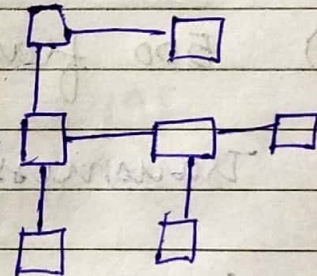
Q 4-a) A 7-bit hamming code is recieved as 0010110. find out whether code is correct or not. If not, correct the code.

D7 D6 P5 P4 D3 P2 P1

0	0	1	0	1	1	0

For even parity

$$P_1 = (D_3\ D_5\ D_7) = 110 \qquad \boxed{P_1 = 0}$$

$P_2 = D_3 D_6 D_7$

| | 1 | 0 | 0 |

$\boxed{P_2 = 0}$

$P_4 = D_5 D_6 D_7$

| 0 | 1 | 0 | 0 |

$\boxed{P_4 = 1}$ error in P_4

Error at bit $= P_4 P_2 P_1$

$$= (1\,0\,0)_2$$
$$= (4)_{10}$$

Error is at 4th bit
Correct code is 0011110

Q4-a)   500 frames per sec

Transmission time of a frame $= \dfrac{200 \text{ kbps}}{200}$

$G = \dfrac{1}{2}$ $= 1$ ms

Throughput in case of slotted ALOHA

$$= G \times e^{-G}$$
$$= 0.303$$
$$= 30.3\%$$

Throughput for 500 frames is $= 500 \times$
$$0.303$$
$$= 151$$
$$\text{frames}$$

Throughput for pure Aloha
$$= G \times e^{-2G}$$
$$= \frac{1}{2} \times e^{-2(\frac{1}{2})}$$
$$= 18.4 \%$$

Through for 500 frames $= 0.184 \times 500$
$$- 92 \text{ frames}.$$

(ii) 250 frames per sec.

$$G = \frac{1}{4}$$

Slotted Aloha $= G \times e^{-G}$
$$= 0.195 = 19.5 \%.$$

For 250 frames $= 250 \times 0.195$
$$= 49 \text{ frames}$$

Pure Aloha $= G \times e^{-2G}$
$$= 0.152 = 15.2 \%.$$

For 250 frames $= 250 \times 0.152 = 38$
$$\text{frames}.$$

Q4-c) Differentiate b/w synchronous &
statistical TDM?

Synchronous	Statical
1.) Data of each I/P connection is divided into units & each I/P occupies one time slot.	slots are alloted dynamically. slot is alloted only if it has data to send.
2.) Synchronization bits are added at the beginning of each frame.	No need of synchronization bits
3.) It carries only data	It carries both data & address of destination
4.) ~~Syn~~ The no. of slots in each frame are equal to no. of output lines	The no. of slots in each frame are less than ~~dut to~~ no. of I/P lines.

Q3 → a) Differentiate b/w broadcast & Point to point network?

| Broadcast	point to point
1.) channel is shared b/w multiple nodes.	A dedicated link is shared b/w 2 devices
2.) It has single transmitter and multiple recievers	It has single transmitter & reciever.

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3.)	less secure	More secure
4.)	capacity is shared b/w devices	Capacity of link is dedicated entirely to the channel.

Q3-b) How does the actual data transfer takes place b/w 2 machines?

The components of communication are

data

| sender | | Reciever |

↑
transmission
media.
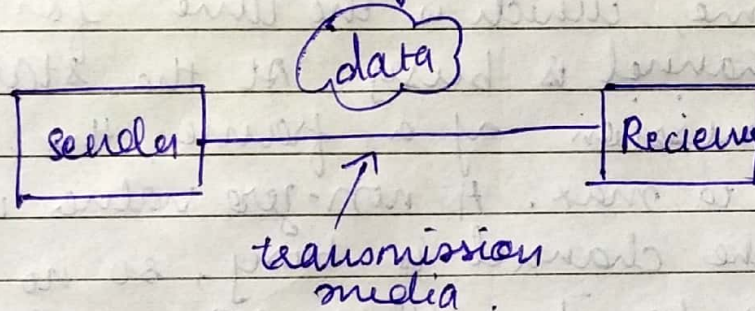
And protocol.

Data transfer is a step by step process, with each step having its own significance. The transmission media that carries the data can be guided or unguided (wireless). The signal recieved by the reciever have the messages in it which can be decrypted using the same set of rules. This can happen due to common set of protocols used across all the n/w devices used in the world.

Q3-(c) what is the purpose of NAV in CSMA/CA?

The network allocation vector (NAV) is a virtual carrier pos sensing mechanism that forms an imp part of CSMA with collision avoidance (CA). This vector can be considered as a counter that counts down to zero. The max NAV duration is the transmission time required by frame, which is the time for which the channel is busy. At the start of transmission of a frame, the NAV value is set to max. A non-zero value indicates that the channel is busy, so no station contacts for it. When NAV value decrement to zero, it indicates that the channel is free & the other stations can contend for it.