L:1

Q1: define data communication + mathematical theory of communication?

DC is the process of using computing and communication technology to transfer data from one place to another

The fundamental problem of communication is that of reproducing at one point either exactly or approximately a message selected at another point

Q2:explain the communication models ?

(source-transmitter -transmission system-receiver-destination)

Q3:explain communication system components

(sender – receiver – message – protocol – transmission medium)

Q4:explain analog and digital data transmission

Analog= continuous digital= discrete

(data – signals – signaling – transmission)

Q5:explain the transmission mediums ?

Fiber optic transmission – wireless transmission

Q6:explain transmission services?

Multiplexing – compression

L :2

Q7:define the network and network terminology?

Network: Group of components or devices which are connected together to give the user a certain service

(stations – nodes – network – trunk - topology)

Q8:explain network components?

(end devices – network devices – connectivity)

Q9: what is the consideration of mediums?

(distance- environment – bandwidth – cost of medium and installation– cost of connectors and equipment)

Q10: explain data communication network criteria ?

(performance – reliable - security)

Q11:explain transmission terminology OR explain line configuration?

(direct link – point to point – multi point)

Q12: explain network topologies?

(physical – logical topology)

(Bus – star – ring – mesh – tree- hybrid)

Q13:compare between logical and physical topologies?

(physical – logical topology)

Q14:explain transmission modes?

(simplex – half duplex – full duplex)

Q15:explain network types?

(LAN -MAN- WAN)

Q16: explain Segments of a Public Network?

(A local area network- campus network - metro network - access network)

L:3

Q17: explain protocol architecture?

There must be a high degree of cooperation between two component systems which want to communicate together

So instead of implementing logic for this as a single module , the task is broken into subtasks , each of which is implemented separately

Modules arranged in a vertical stack

-each layer perform related subset of functions required to communicate with other systems

-rely on next lower layer and provide services to next higher layer

-changes in one layer should not requite changes in other layers

Q18:explain reference models? And what is the importance of it?

- The process of giving a conceptional framework that standardized communication between hetero networks
- Is a framework for network implantation and trouble shooting
- it divided complex functions into simpler components
- importance (-standardization[vendor interoperability]-better understanding of data transfer – achieve open interconnection between multi vendors)

Q19: explain types of reference models OR define OSI – TCP/IP model ?

(OSI – TCP/IP)

Q20:explain layers of OSI ?

(application – presentation – session – transport – network – data link – physical)

Q21:explain TCP/IP layers

(application – transport [TCP] – internet -network[data link]-physical)

Q22: what is the key parallels of OSI – TCP/IP layers?

Transport layer and network layer

Q23:what is addressing requirement ? and explain that with drawing addressing between 2 ?

(unique Ip – unique port)

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Q24: explain encapsulation and decapsulation ?

Encapsulation :Process of adding control information as it passes down through the layered model.

Decapsulation: Process of removing control information as it passes down through the layered model.

Q25:explain the protocol data unit PDU?

PDUs are named according to the protocols of the TCP/IP suite.

Data: The general term for the PDU used at the Application layer

Segment: Transport Layer PDU

Packet: Internetwork Layer PDU

Frame: Network Access Layer PDU

Bits: A PDU used when physically transmitting data over the medium

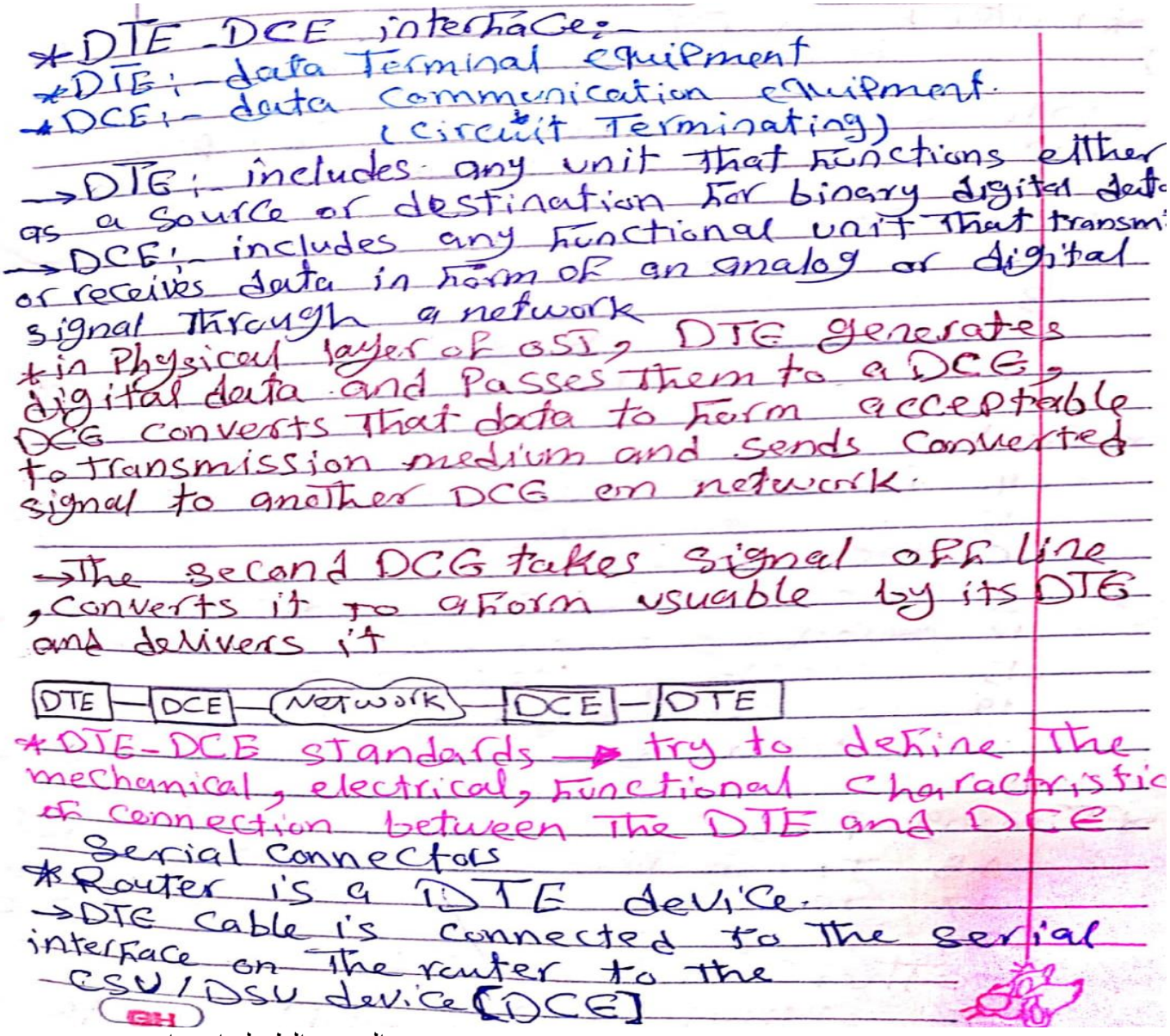
L : 4

Q26: explain types of data transmission of digital data ?

(parallel – serial)transmission

Q27: compare between Asynchronous and Synchronous Transmission?

Q28: explain DTE-DCE interface with Synchronous Full Duplex Transmission?



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The DTE cable will always be male and the DCE cable will always be female.

Q29:explain types of errors ?

(single bit – burst -multiple bit)

Q30: explain error detection ?

Q31:explain error detection methods ?

error detection
① Vertical redundancy check (VRC)
② longitudinal " " (LRC)
③ checksum
④ cyclic Redundancy Check (CRC)

1- VRC :- (Parity check)
even parity generator checks ① in bits result ①, if odd number of 1's
=0 if even " " 1's
يعني بيعمل check على كل الوحايد اللي موجوده في رقم binary ولو طلع رقم الوحايد دول فردي هيدي بـ 1
ولو طلع رقم الوحايد زوجي هيدي بـ 0
Then This result will be sent to the receiver.
receiverx ex [1][11000001]
NRC data
111000000001
The receiver check this if its an 1's even then there is no errors but if 0 → it's error.

VRC = detect single bit errors but can detect brust error if only no of errors is odd.

② LRC:- a block of bits is organized in Row and Coulmn. (two dimensional Parity)
- The Parity bit is calculated for each Coulmn and sent along with the data.
- The block of Parity acts as the redundant bits.

③ Checksum
- sender side = checksum creation
- receiver side = checksum validation

1- Creating
1- break original message in to 'k' number of blocks with 'n' bits in each block
2- sum all 'k' data blocks
3- add carry to sum, if any
4- do 1's complement to the sum = checksum

2 Validation
- Collect all data blocks including checksum
- sum all data blocks + checksum
- if the result is all 1's accept
else reject.

④ Cyclic Redundency check (CRC)
Sender side
1- Find length of divisior (L)
2- append (L-1) bits to the original message
3- Perform binary division operation
4- remainder of division = CRC

Q32:explain ways of error correction and how it works ?

Ways :

1-forward error correction: the receiver use error correcting code which automatically corrects the error

2-backword error correction: if error detected,the receiver can have the sender retransmit the entire data again

How it works:

adds redundancy to transmitted message(means data + redundancy bits)

L:5

Q33: explain line discipline in data link layer ?

(ENQ/ACK–poll/select)الرسمتين دول واشرح الرسمه

Q34: explain follow control in data link layer ?

(stop and wait – sliding window)

Q35: explain stop and wait ARQ [error control]?

Q36:explain sliding window ARQ ?

(go back N – selective)

Q37:explain ARQ?

Means to turn a potentially unreliable data link into a reliable one

- stop and wait
- go back N
- selective

all these forms based on the use of the flow controls technology

L:6

Q38: explain High Level Data Link Control Station types?

(primary – secondary - combined)

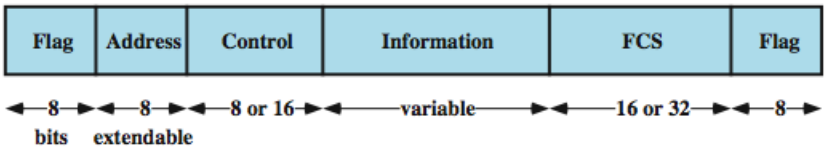
Q39: explain High Level Data Link Control Link configurations ?

(unbalanced – balanced)

Q40: explain High Level Data Link Control (HDLC)Transfer Modes?

(Normal Response Mode (NRM) - Asynchronous Balanced Mode (ABM) - Asynchronous Response Mode (ARM))

Q41: explain High Level Data Link Control frame structure?



(a) Frame format

(flag- address- control – information – fcs)

Q42: explain HDLC frame types?

- Information frames(I-frames)

- Supervisory frames (S-frames)

- Unnumbered frames (U-frames)

Explain all of them from control field

Q43:define bit stuffing?

is the insertion of non information bits into data.

Bit stuffing used to avoid confusion with data containing flag seq 01111110

-0 inserted after every sequence of five 1 s

-if receiver detects five 1 s it checks next bit

-if next bit is 0 , it is deleted (was stuffed

-if next bit is 1 and seventh bit is 0 , accept as flag

-if sixth and seventh bits 1 , sender is indicating abort

Q44:explain means of poll/final?

Q45: explain with drawing HDLC operation?

exchange of information, supervisory and unnumbered frames

(Initialization - Data transfer - Disconnect)

هو هيوضحلى انهى حاله عاوزها وارسم انا الرسمه بتاعتها من ال 5 رسومات اللى موجوده دى

L:7

Q46: explain storage area network SAN?

Q47:explain layers of IEEE802 ?

(physical- LLC – MAC)

Q48:draw LLC (PDU)frame then explain its fields ?

Q49:what is Medium Access Control (MAC) Protocol?

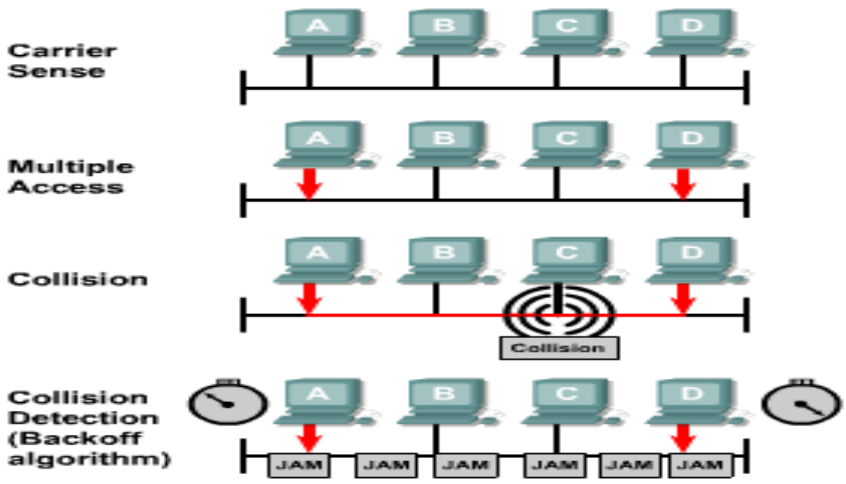
L:8

Q50:draw MAC frame then explain its fields ?

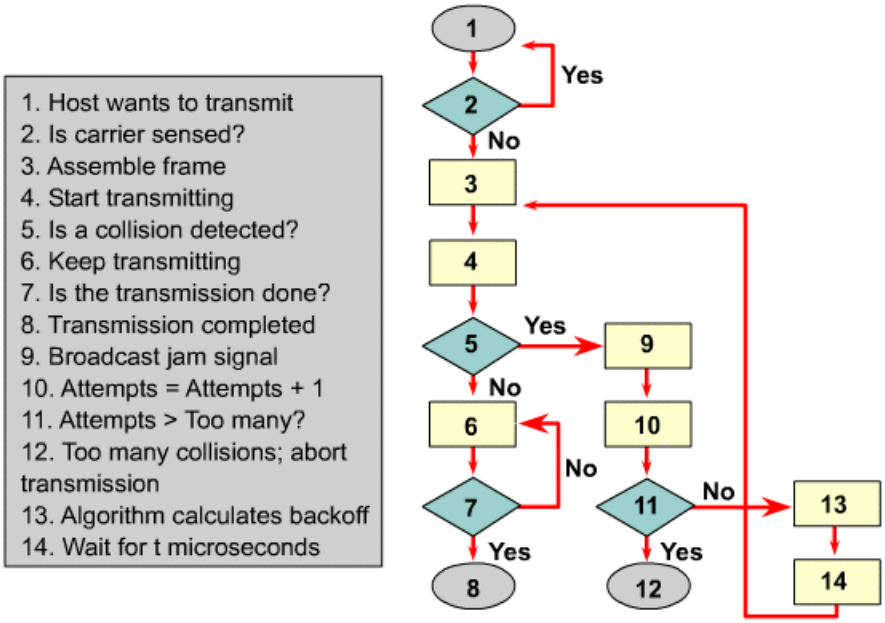
Q51: compare between pure aloha and slotted aloha ?

Q52:explain about CSMA/CD?

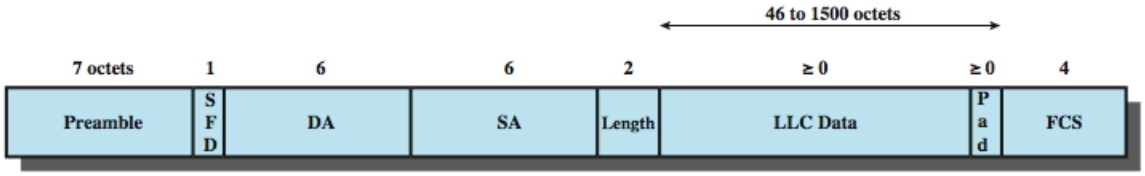
Q53: explain CSMA/CD operation?



Q54:draw Collision detection flowchart ?



Q55: explain IEEE 802.3 Frame Format (Ethernet- CSMA) and explain the fields?



SFD = Start of frame delimiter
DA = Destination address
SA = Source address
FCS = Frame check sequence

L:9

Q56: explain Hierarchical Network Design layers?

(access – distribution – core)

Q57:explain Benefits of a Hierarchical Network?

(scalability – redundancy – performance-security- manageability -maintainability)

Q58: explain network diameter + bandwidth aggregation + redundant component ?

Q59:explain virtual Lan and its application?

Vlan: is a broadcast domain consisting of a group of end stations not limited by physical location and communicate as if they were on a common LAN

Applications:

- VLAN is used when you have 200+ devices on your LAN.
- It is helpful when you have a lot of traffic on a LAN.
- VLAN is ideal when a group of users need more security or being slow down by many broadcasts.
- Make a single switch into multiple switches.

Q60:what is the ways to establish Vlan ?

(static – dynamic)

Q61: compare between Lan Vlan?

LAN	VLAN
LAN can be defined as a group of computer and peripheral devices which are connected in a limited area.	A VLAN can be defined as a custom network which is created from one or more local area networks.
The full form of LAN is Local Area Network	The full form of VLAN is Virtual Local Area Network.
The latency of LAN is high.	The latency of VLAN is less.
The cost of LAN is high.	The cost of a VLAN is less.
In LAN, the network packet is advertised to each and every device.	In VLAN, the network packet is sent to only a specific broadcast domain.