Q1

S_1 : When data + acknowledgement is sent together, it is called piggy backing.

S_2 : SYN segment consumes 1 sequence no.

Which of the following are true:-

A. Only S_1
B. Only S_2
C. **Both S_1 & S_2**
D. None

Q2 : Order the 3 way handshake mechanism:

A) Data Transmission

B) Connection Termination

C) Connection Establishment

C , A , B

Q3: What is the payload of TCP SYN segment.

>> 0

Q4 : Choose the best matching:

A) Cookies

B) DNS

C) Remote login

D) Global Link state

i) Caching

ii) Telnet

iii) Server

iv) LSR

A - iii
B - i
C - ii
D - iv

Q5: Range of TCP header length field is

>> (5 - 15)

Q6: Lifetime of TCP segment is _____ seconds.

>> 180 Seconds (at max)

Q7

S_1 : Size of redundant bits depend upon size of dataword as well as the number of bits error that should be corrected.

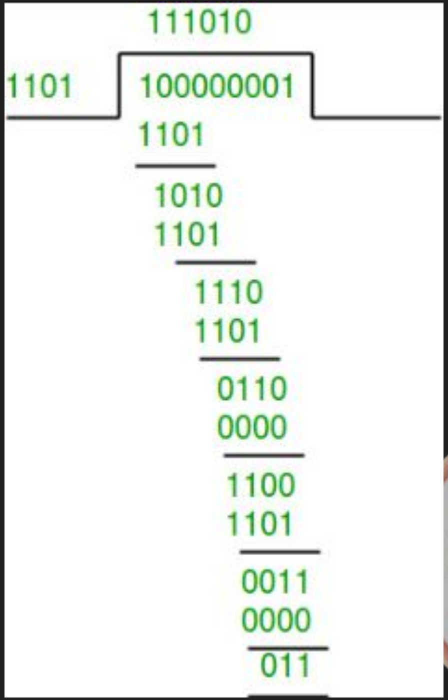
S_2 : If the common medium is being accessed by multiple nodes there is chance of collision

Which of the following are true:-

A. Only S_1
B. Only S_2
C. **Both S_1 & S_2**
D. None

Q8: In CRC message is 100000001 and divisor is 1101. What is the transmitted data?

>> 100000001011



Q9

S_1 : Simple parity check can check maximum one bit error

S_2 : Limitation of 2-d parity is it can maximum check 3 bits.

Which of the following are true:-

A. Only S_1
B. Only S_2
C. **Both S_1 & S_2**
D. None

Q10: Message: 01110110

Flag: 0111

Sent data after bit stuffing?

>> 0110101100

In the above question, if, in the data link layer bits stuffing is employed then bit stuffing is done using the flag delimiter. If there is a flag of n bits then we will compare the data sequence with the flag and for every n-1 bits matched found, a bit 0 is stuffed in the data sequence after the matched sequence.

Thus using the above logic

Delimiter flag: 0111

Data sequence: 01110110

So, for a flag of 4 bits we will compare data sequence with pattern of 3 bits i.e. 011.

0 1 1 0 1 0 1 1 0 0

In the above pattern the underlined bits are found matched, hence, 0 in italics is stuffed. Thus resulting in the data sequence as 0110101100

Q11: For sliding window protocol (1+2a)=100 and no of bits for sequence number is 6 what is the window size?

>> minimum(1+2a, 2^n)

= 64

Q12: In the previous question, what is Efficiency?

>> 64/100=64%

Q13

S_1 : In stop and wait protocol if we have a high capacity pipe then we have low Efficiency.

S_2 : To have 100% Efficiency we need to send (1+2a) packets in sliding window protocol.

Which of the following are true:-

A. Only S_1
B. Only S_2
C. **Both S_1 & S_2**
D. None

Q14: If we are sending ‘n’ packets with ‘p’ error probability then total number of packets sent in stop and wait protocol is:

>> [$n/(1-p)$]

1)Missing Probability of channel is $1/n$(One pkt. out of n will be lost)
2)No. of total transmission= Total Pkt*($1/1-n$) where n is missing Probability
Here, $n*(1/1-(1/n))$ after solving we get, $n^2/(n-1)$
3) Now, Re-transmission=Actual no. of pkt - Total pkt with missing calculation
Here, $n-n^2/(n-1)$ after solving we get
$n/(n-1)$

Q15

S_1 : In stop and wait protocol queuing and processing delay depends upon speed of processor

S_2 : In stop and wait protocol efficiency is good for short length and small data packets

Which of the following are true:-

A. **Only S_1**
B. Only S_2
C. Both S_1 & S_2
D. None

Q16: Range of Private addressing are:

>> 10.0.0.0------10.255.255.255

192.168.0.0------192.168.255.255

172.16.0.0--------172.31.255.255

24-bit block	**10.0.0.0 – 10.255.255.255**	single class A network
20-bit block	172.16.0.0 – 172.31.255.255	16 contiguous class B networks
16-bit block	192.168.0.0 – 192.168.255.255	256 contiguous class C networks

Q17

S_1 : For super netting networks first network address of block must be evenly divisible by whole size of super network.

S_2 : 200.1.0.0/24, 200.1.1.0/24, 200.1.2.0/24, 200.1.3.0/24
These can be combined?

Which of the following are true:-

A. Only S_1
B. Only S_2
C. **Both S_1 & S_2**
D. None

>> To determine whether the given IP subnets can be combined or aggregated, we need to check if they have a common network prefix. The network prefix is the portion of the IP address that remains the same across all the subnets. In this case, we have the following subnets:

200.1.0.0/24

200.1.1.0/24

200.1.2.0/24

200.1.3.0/24

To combine these subnets, we look at the network portions (the first three octets) of the IP addresses. In this case, the network portions are all the same (200.1.0).

However, to determine if they can be combined, we also need to consider the subnet masks. In this case, the subnet masks are all /24, which means the first 24 bits of the IP address are used for the network portion.

Since the network portions and subnet masks are the same for all the subnets, we can combine them into a single larger subnet. The aggregated subnet would be 200.1.0.0/22, which means the first 22 bits of the IP address are used for the network portion.

Therefore, the given subnets can be combined into a single subnet: 200.1.0.0/22.

Q18: a.b.c.d/31?What is the no. of hosts available?

>> zero

No of ip address possible =2

One goes for network id other goes for DBA

Q19: For a classless network 10.1.2.0/20 what does ‘/20’ represents?

>> No of bits used for block id.

Q20: Subnet mask is 255.255.255.224 no of hosts for this network?

>> 2^5-2=30

Q21

S_1 : We can't force host to send data packet to router first and not directly to destination host even though in same network

S_2 : Without subnetting we can create an illusion of subnetting with subnet mask.

Which of the following are true:-

A. Only S_1
B. **Only S_2**
C. Both S_1 & S_2
D. None

Q22

S_1 : Subnetting is a process of taking bits from the host part.

S_2 : If size of networks are same they will have same subnet mask

Which of the following are true:-

A. Only S_1
B. Only S_2
C. **Both S_1 & S_2**
D. None

ept

Q23: If we divide a network into 8 subnets how many IP addresses do we lose?

>> 2*no of subnets = 16-2= 14

Q24

S_1 : Subnetting gives easy management

S_2 : No. of steps increases in subnetting

Which of the following are true:-

A. Only S_1
B. Only S_2
C. **Both S_1 & S_2**
D. None

Q25: LBA for class c network is?

255.255.255.255

255.255.255.0

0.0.0.0

192.0.0.0

>>255.255.255.255

Q26: No. of networks possible for class c is?

>> 2^21

Q27: DDR stands for?

>> Dotted decimal representation.

Q28: Consider a TCP connection between a client and a server with the following specifications: the round trip time is 6 ms, the size of the receiver advertised window is 50 KB, slow start threshold at the client is 32 KB, and the maximum segment size is 2 KB. The connection is established at time t = 0. Assume that there are no timeouts and errors during transmission.
Then the size of the congestion window (in KB) at time t + 60 ms after all acknowledgements are processed is ________.

>> 44KB

>> Threshold = 32 Kb,
MSS = 2KB,
RTT = 6ms
Here, t + 60 is nothing but at the 10 RTT (60/6 = 10).
Now,
1st transmission: 2 KB
2nd transmission: 4 KB
3rd transmission: 8 KB
4th transmission: 16 KB
5th transmission: 32 KB (Threshold reached)
6th transmission: 34 KB
7th transmission: 36 KB
8th transmission: 38 KB
9th transmission: 40 KB
10th transmission: 42 KB
Now, after receiving acknowledgements of 10th transmission RTT = 10*6 = 60 ms.
And, after receiving acknowledgements of 10th transmission RTT (means at 11th transmission),
The congestion window size will be 44 KB.

Q29: A TCP server application is programmed to listen on port number P on host S. A TCP client is connected to the TCP server over the network. Consider that while the TCP connection was active, the server machine S crashed and rebooted. Assume that the client does not use the TCP keepalive timer.

Which of the following behaviors is/are possible?

A) **If the client was waiting to receive a packet, it may wait indefinitely**

B) **The TCP server application on S can listen on P after reboot**

C) **If the client sends a packet after the server reboot, it will receive a RST segment**

D) If the client sends a packet after the server reboot, it will receive a FIN segment

Q30: Consider two hosts P and Q connected through a router R. The maximum transfer unit (MTU) value of the link between P and R is 1500 bytes, and between R and Q is 820 bytes.
A TCP segment of size 1400 bytes was transferred from P to Q through R, with IP identification value as 0×1234. Assume that the IP header size is 20 bytes. Further, the packet is allowed to be fragmented, i.e., Don’t Fragment (DF) flag in the IP header is not set by P.

Which of the following statements is/are correct?

A) Two fragments are created at R and the IP datagram size carrying the second fragment is 620 bytes.

B) If the second fragment is lost, R will resend the fragment with the IP identification value 0×1234.

C) If the second fragment is lost, P is required to resend the whole TCP segment.

D) TCP destination port can be determined by analysing only the second fragment.

Q31: Consider a source computer (S) transmitting a file of size 10^6 bits to a destination computer (D) over a network of two routers (R_1 and R_2) and three links (L_1, L_2, and L_3). L_1 connects S to R_1; L_2 connects R_1 to R_2; and L_3 connects R_2 to D. Let each link be of length 100 km. Assume signals travel over each line at a speed of 10^8 meters per second. Assume that the link bandwidth on each link is 1 Mbps. Let the file be broken down into 1000 packets each of size 1000 bits. Find the total sum of transmission and propagation delays in transmitting the file from S to D?

A) 1005 ms

B) 1010 ms

C) 3000 ms

D) 3003 ms

>> Signal Speed = 10^8 m/s
Bandwidth, BW = 1 Mbps = 10^6 bps
Propagation time, Tp = Link Distance/ Link Speed = (100x10^3)/(10^8) = 10^-3 sec = 1 ms.
[Propagation time is the time taken by packet to travel through the link]
Transmission time for 1 packet, Tt = Packet Size / BW = 1000 / 10^6 = 10^-3 sec = 1 ms.
[Transmission time is the time taken by source or router to process or put the data on Link]
Link filling time can be calculated as:
Pipeline Filling time

Time	L1	R1	L2	R2	L3	D
t=0						
t=1	P1					
t=2	P2	P1				
t=3	P3	P2	P1			
t=4	P4	P3	P2	P1		
t=5	P5	P4	P3	P2	P1	
t=6	P6	P5	P4	P3	P2	P1

This way time taken by packet P1 to reach Destination (D) = 6 ms
Now, as you can see, at every ms, 1 packet will reach D.
Therefore, time taken for remaining 999 packets = 999 ms.
So, total time taken to transmit 1000 packets = 999 + 6 = 1005 ms.

Q32: Host A is sending data to host B over a full duplex link. A and B are using the sliding window protocol for flow control. The send and receive window sizes are 5 packets each. Data packets (sent only from A to B) are all 1000 bytes long and the transmission time for such a packet is 50 MICROSEC Acknowledgement packets (sent only from B to A) are very small and require negligible transmission time. The propagation delay over the link is 200 microsec. What is the maximum achievable throughput in this communication?

>> ((5*1000*bytes)/450 microsec)

= 11.1111 * 10^6 bytes per second

Q33: What is the PORT NO OF POP3 AND DNS?

>>110 and 53

Q34: Station A uses 32 byte packets to transmit messages to Station B using a sliding window protocol. The round trip delay between A and B is 80 milliseconds and the bottleneck bandwidth on the path between A and B is 128 kbps. What is the optimal window size that A should use?

>>Frame size = 32*8 bits

Bandwidth = 128kbps

Transmission Time = 32*8/(128) ms = 2 ms

RTT = Tt + 2*Tp

80 = 2 + 2*Tp

Tp = 39

Let n be the window size.

Utilization = n/(1+2a) where a = Propagation time / transmission time

Utilization = 1 (Max)

n = 1+2a

= 1 + 2 * Tp/Tt

= 1 + 2 * 39/2

n = 40

Sliding Window Size = 40.

Q35: The distance between two stations M and N is L kilometers. All frames are K bits long. The propagation delay per kilometer is t seconds. Let R bits/second be the channel capacity. Assuming that processing delay is negligible, the minimum number of bits for the sequence number field in a frame for maximum utilization, when the sliding window protocol is used:

(A) $\left\lceil \log_2 \frac{2LtR + 2K}{K} \right\rceil$ (B) $\left\lceil \log_2 \frac{2LtR}{K} \right\rceil$

(C) $\left\lceil \log_2 \frac{2LtR + K}{K} \right\rceil$ (D) $\left\lceil \log_2 \frac{2LtR + K}{2K} \right\rceil$

>>Option C

>> Ws(window size of sender)$=1+2a$ where $a=Tp/Tt$

minimum sequence number possible= $1+2a$

min. num of bit for sequence number = $\lceil \log(1+2a) \rceil$ * Equation 1

$Tp/Tt=Lt/(K/R)$

$1+2a=(K+2LtR)/K$

put value of $1+2a$ in eq 1

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(Prepared by rankers: Divyanshu Hymavati Ratul & Soumya)

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Q36: What is the Port No. of TELNET?

>>23

Q37: Consider the data of previous question. Suppose that the sliding window protocol is used with the sender window size of 2^i where is the number of bits identified in the previous question and acknowledgments are always piggybacked. After sending 2^i frames, what is the minimum time the sender will have to wait before starting transmission of the next frame? (Identify the closest choice ignoring the frame processing time.)

A) 16ms

B) 18ms

C) 20ms

D) 22ms

>> Size of sliding window = 2^5 = 32
Transmission time for a frame = 1ms
Total time taken for 32 frames = 32ms
Total time = 2tx + 2tp = 2+50 = 52ms
After sending 32 frames, the minimum time the sender will have to wait before starting transmission of the next frame = 52 – 32 = 20

Q38: Frames of 1000 bits are sent over a 10^6 bps duplex link between two hosts. The propagation time is 25ms. Frames are to be transmitted into this link to maximally pack them in transit (within the link).
What is the minimum number of bits (i) that will be required to represent the sequence numbers distinctly? Assume that no time gap needs to be given between transmission of two frames.

A) i=2

B) i=3

C) i=4

D) i=5

Transmission delay for 1 frame = 1000/(10^6) = 1 ms
Propagation time = 25 ms
The sender can atmost transfer 25 frames before the first frame reaches the destination.
The number of bits needed for representing 25 different frames = 5

Q39: Let G(x) be the generator polynomial used for CRC checking. What is the condition that should be satisfied by G(x) to detect odd number of bits in error?

A) G(x) contains more than two terms

B) G(x) does not divide 1+x^k, for any k not exceeding the frame length

C) 1+x is a factor of G(x)

D) G(x) has an odd number of terms.

Q40: Consider a selective repeat sliding window protocol that uses a frame size of 1 KB to send data on a 1.5 Mbps link with a one-way latency of 50 msec. To achieve a link utilization of 60%, the minimum number of bits required to represent the sequence number field is _________.

>>Transmission delay = Frame Size/bandwidth

= (1*8*1024)/(1.5 * 10^6)=5.33ms

Propagation delay = 50ms

Efficiency = Window Size/(1+2a) = .6

a = Propagation delay/Transmission delay

So, window size = 11.856(approx)

min sequence number = 2*window size = 23.712

bits required in Min sequence number = $\log_2(23.712)$

Answer is 4.56

Ceil(4.56) = 5

Q41: A sender uses the Stop-and-Wait ARQ protocol for reliable transmission of frames. Frames are of size 1000 bytes and the transmission rate at the sender is 80 Kbps (1Kbps = 1000 bits/second). Size of an acknowledgment is 100 bytes and the transmission rate at the receiver is 8 Kbps. The one-way propagation delay is 100 milliseconds. Assuming no frame is lost, the sender throughput is ___________ bytes/second.

Throughput= datasize/total time

where total time= Transmission time of sender + Transmission time of receiver + 2* PT

so, total time = 1/10+ 1/10+200×10^-3

= 4/10

Now, Throughput = 1000/0.4 =2500 bytes

Q42: Consider a 128×10^3 bits/second satellite communication link with one way propagation delay of 150 milliseconds. Selective retransmission (repeat) protocol is used on this link to send data with a frame size of 1 kilobyte. Neglect the transmission time of acknowledgement. The minimum number of bits required for the sequence number field to achieve 100% utilization is __________.

>>For 100% efficiency, 1=N* Tt/364

→ 64*N=364

N=364/64 =5.6 that is 6

Seq. no.=2N=12

now log base 2 ceil 12=4 i.e the ans

Q43: The maximum window size for data transmission using the selective reject protocol with n-bit frame sequence numbers is:

>>2^N-1

Q44: A bit-stuffing based framing protocol uses an 8-bit delimiter pattern of 01111110. If the output bit-string after stuffing is 01111100101, then the input bit-string is

A) 0111110100

B) 0111110101

C) 0111111101

D) 0111111111

Q45: A link has a transmission speed of 10^6 bits/sec. It uses data packets of size 1000 bytes each. Assume that the acknowledgement has negligible transmission delay, and that its propagation delay is the same as the data propagation delay. Also assume that the processing delays at the nodes are negligible. The efficiency of the stop-and-wait protocol in this setup is exactly 25%. The value of the one-way propagation delay (in milliseconds) is ____________.

>>Transmission time Tt=1000*8/10^6=8/10^3 sec=8 ms

efficiency =25%=1/4=Tt/(Tt+2*Tp)

8/(8+2*Tp)=1/4

Tp=12

so propagation Delay is 12 ms

Q46: A 2 km long broadcast LAN has 10^7 bps bandwidth and uses CSMA/CD. The signal travels along the wire at 2×10^8 m/s. What is the minimum packet size that can be used on this network?

For CSMA/CD Protocol formula of minimum packet size

$L >= 2*T_p*B$

where B is the bandwidth and T_p is the propagation delay which is D/V D is the distance and V is the velocity that signal travels through the wire so by putting all these values we get that L>= 200 bits which is L>= 25 bytes

Q47: Suppose the round trip propagation delay for a 10 Mbps Ethernet having 48-bit jamming signal is 46.4 μs. The minimum frame size is

\>> $Td \geq 2 \times Tp + Td(\text{ for jam signal})$

$Td \geq Rtt + (\text{ Length of jam signal } / \text{ Bandwidth })$

$Td \geq 46.4\mu s + (48 \text{ bit} / 10 \times 10^6 \text{ bits/sec})$

$Td \geq 46.4 \times 10^{-6} \text{ sec} + (4.8 \times 10^{-6} \text{ sec})$

$Td \geq 51.2 \times 10^{-6} \text{ sec}$

$(\text{ Frame Size} / \text{Bandwidth}) \geq 51.2 \times 10^{-6} \text{ sec}$

$\text{Frame Size} \geq 51.2 \times 10^{-6} \text{ sec} \times \text{ Bandwidth}$

$\text{Frame Size} \geq 51.2 \times 10^{-6} \text{ sec} \times 10 \times 10^6 \text{ bits/second}$

$\text{Frame Size} \geq 512 \text{ bits}$

So , minimum frame size is 512 bits.

Q48: Determine the maximum length of cable (in km) for transmitting data at a rate of 500 Mbps in an Ethernet LAN with frames of size 10,000 bits. Assume the signal speed in the cable to be 2,00,000 km/s.

10000/(500*1000000) >= 2*length/200000

=> length = 2km

so,

Answer = 2 Km.

Q49: Consider a LAN with four nodes S_1, S_2, S_3 and S_4. Time is divided into fixed-size slots, and a node can begin its transmission only at the beginning of a slot. A collision is said to have occurred if more than one node transmit in the same slot. The probabilities of generation of a frame in a time slot by S_1, S_2, S_3 and S_4 are 0.1, 0.2, 0.3 and 0.4, respectively. The probability of sending a frame in the first slot without any collision by any of these four stations is ________.

= 0.1 * (1 - 0.2) * (1 - 0.3) *(1 - 0.4) +
(1 -0.1) * 0.2 * (1 - 0.3) *(1 - 0.4) +
(1 -0.1) * (1 - 0.2) * 0.3 *(1 - 0.4) +
(1 -0.1) * (1 - 0.2) * (1 - 0.3) * 0.4

= 0.4404

Q50: For the IEEE 802.11 MAC protocol for wireless communication, which of the following statements is/are TRUE?

A) At least three non-overlapping channels are available for transmissions.

B) The RTS-CTS mechanism is used for collision detection.

C) Unicast frames are ACKed.

Q51: Consider a simple communication system where multiple nodes are connected by a shared broadcast medium (like Ethernet or wireless). The nodes in the system use the following carrier-sense based medium access protocol. A node that receives a packet to transmit will carrier-sense the medium for 5 units of time. If the node does not detect any other transmission, it starts transmitting its packet in the next time unit. If the node detects another transmission, it waits until this other transmission finishes, and then begins to carrier-sense for 5 time units again. Once they start to transmit, nodes do not perform any collision detection and continue transmission even if a collision occurs. All transmissions last for 20 units of time. Assume that the transmission signal travels at the speed of 10 meters per unit time in the medium.

Assume that the system has two nodes p and Q, located at a distance D meters from each other. Pstart transmitting a packet at time T=0 after successfully completing its carrier-sense phase. Node Q has a packet to transmit at time T=0 and begins to carrier-sense the medium.

The maximum distance D (in meters, rounded to the closest integer) that allows Q to successfully avoid a collision between its proposed transmission and P’s ongoing transmission is ________.

P starts to transmit at t=0. If P's first bit reaches Q within Q's sensing window, then Q won't transmit and there shall be no collision.

Q senses carrier till t=5. At t=6 it starts its transmission.

If the first bit of P reaches Q by t=5, collision can be averted. Since signal speed is 10 m/time , so can conclude that max distance between P and Q can be 50 meters

Q52: Port no for IMAP4 is?

A) 110

B) 24

C) **143**

D) 53

Q53: A network has a data transmission bandwidth of 20×10^6 bits per second. It uses CSMA/CD in the MAC layer. The maximum signal propagation time from one node to another node is 40 microseconds. The minimum size of a frame in the network is ___________ bytes.

>> 2* propagation delay * bw

L = 2* (40/10^6) * 20*10^6

L = 1600 bits(because of bandwidth in bits)

L=1600/8

L=200 Bytes

Q54: Consider that 15 machines need to be connected in a LAN using 8-port Ethernet switches. Assume that these switches do not have any separate uplink ports. The minimum number of switches needed is ______.

>> Using 3 switches we can connect maximum 20 machines together.

∴ We require at least 3 switches to connect 15 machines.

Q55: In a network of LANs connected by bridges, packets are sent from one LAN to another through intermediate bridges. Since more than one path may exist between two LANs, packets may have to be routed through multiple bridges. Why is the spanning tree algorithm used for bridge-routing?

>> For avoiding loops in routing path DATA UNIT PROTOCOL IS USED.

Q56: Consider a CSMA/CD network that transmits data at a rate of 100 Mbps (10^8 bits per second) over a 1 km (kilometre) cable with no repeaters. If the minimum frame size required for this network is 1250 bytes, what is the signal speed (km/sec) in the cable?

A) 8000

B) 10000

C) 16000

D) 20000

>> Transmission Time >= 2*Propagation Time

=> $1250*8 / (100 * 10^6) <= 2*length/signal\_speed$

=> $signal\_speed <= (2 * 10^3 * 100 * 10^6) / (1250 * 8)$

$<= 2 * 10 * (10^3)$ km/sec

<= 20000

Q57: In an Ethernet local area network, which one of the following statements is TRUE ?

A) A station stops to sense the channel once it starts transmitting a frame.

B) The purpose of the jamming signal is to pad the frames that are smaller than the minimum frame size.

C) A station continues to transmit the packet even after the collision is detected.

D) The exponential backoff mechanism reduces the probability of collision on retransmissions

Q58: Consider the resolution of the domain name www.gate.org.in by a DNS resolver. Assume that no resource records are cached anywhere across the DNS servers and that iterative query mechanism is used in the resolution. The number of DNS query-response pairs involved in completely resolving the domain name is ___________.

>> 4

The DNS resolver goes to root server and then forwards to top level domain and forwards to secondary to level domain and gets IP address from authoritative DNS server.

Q59: Which of the following functionality *must* be implemented by a transport protocol over and above the network protocol?

A) Recovery from packet losses

B) Detection of duplicate packets

C) Packet delivery in the correct order

D) End to end connectivity

Q60: Packets of the same session may be routed through different paths in______ AND_________?

>> TCP & UDP

Q61: Which of the following system calls results in the sending of SYN packets?

A) **Connect**

B) Listen

C) Socket

D) Bind

Q62: What is the maximum size of data that the application layer can pass on to the TCP layer below?

>> Any Size

Q63: Which transport layer protocol is used to support electronic mail?

>> TCP

Q64: The transport layer protocols used for real time multimedia, file transfer, DNS and email, respectively are

>> UDP - Multimedia

TCP - File transfer

UDP - DNS

TCP - Email

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Q65: Which socket API functions converts an unconnected active TCP socket into a passive socket?

>> Listen

Q66: Suppose two hosts use a TCP connection to transfer a large file.Which of the following statements is/are FALSE with respect to the TCP connection?

I. If the sequence number of a segment is m, then the sequence number of the subsequent segment is always m + 1.

II. If the estimated round trip time at any given point of time is t sec, the value of the retransmission timeout is always set to greater than or equal to t sec.

III. The size of the advertised window never changes during the course of the TCP connection.

IV. The number of unacknowledged bytes at the sender is always less than or equal to the advertised window

Q67

S_1 : TCP connections are full duplex

S_2 : TCP has no option for selective acknowledgment

S_3 : TCP connections are message streams

Which of the following are true:-

A. **Only S_1**
B. Only S_2
C. Only S_3
D. All of the above

Q68: Consider a long-lived TCP session with an end-to-end bandwidth of 1 Gbps (= 10^9 bits-per-second). The session starts with a sequence number of 1234. The minimum time (in seconds, rounded to the closest integer) before this sequence number can be used again is ________ .

A) 34

B) 4.30

C) 43

D) None of these

>> Wrap around = (Total data) / (Bandwidth)

= (2^{32} bytes) / (10^9 bits per second)

= (2^{32} * 8 bits) / (10^9 bits per second)

= 34.35 seconds = 34 (in seconds)

Q69: Which of the following protocol pairs can be used to send and retrieve emails (in that order)?

A) IMAP , POP3

B) SMTP, POP3

C) SMTP, MIME

D) IMAP, SMTP

Q70: Consider the data transfer using TCP over a 1 Gbps link. Assuming that the maximum segment lifetime (MSL) is set to 60 seconds, the minimum number of bits required for the sequence number field of the TCP header, to prevent the sequence number space from wrapping around during the MSL is ________.

Bandwidth = 1Gbps = $\frac{1}{8} * 10^9$bps .

In 60 seconds

No of bytes to be transferred = $60*\frac{1}{8}*10^9$,

i.e. $7.5*10^9$ Bytes

So, TCP will generate $7.5*10^9$ Sequence numbers within 60 seconds. To generate $7.5*10^9$ unique sequence no. we need

ceil(log($7.5*10^9$))=ceil(32.8) =

33 bits in the sequence no. field

Q71: Consider a 100 Mbps link between an earth station (sender) and a satellite (receiver) at an altitude of 2100 km. The signal propagates at a speed of 3 × 10^8 m/s. The time taken (in milliseconds, rounded off to two decimal places) for the receiver to completely receive a packet of 1000 bytes transmitted by the sender is ____.

The time required for the receiver to receive the packet is transmission time (Tt)+ propagation time(Tp) ,

i.e. Tt + Tp

. Tt = 1000*8 bits/10^8 bps

= 0.08 ms

Tp = 2100*1000m / 3*10^8m

= $7*10^5/10^8$

= 7ms

Hence, total time required = 7.08 ms

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Q72 : Choose the best matching:

A) SMTP

B) BGP

C) TCP

D) PPP

i) Application layer

ii) Transport layer

iii) Data link layer

iv) Network layer

A - i
B - iv
C - ii
D - iii

Q73: A graphical HTML browser resident at a network client machine Q accesses a static HTML webpage from a HTTP server S. The static HTML page has exactly one static embedded image which is also at S. Assuming no caching, which one of the following is correct about the HTML webpage loading (including the embedded image)?

A) Q needs to send at least 2 HTTP requests to S, each necessarily in a separate TCP connection to server S

B) Q needs to send at least 2 HTTP requests to S, but a single TCP connection to server S is sufficient

C) A single HTTP request from Q to S is sufficient, and a single TCP connection between Q and S is necessary for this

D) A single HTTP request from Q to S is sufficient, and this is possible without any TCP connection between Q and S

Q74

S_1 : Destination MAC address of an ARP reply is a broadcast address.

S_2 : Destination MAC address of an ARP request is a broadcast address.

Which of the following are true:-

A. Only S_1
B. **Only S_2**
C. Both S_1 & S_2
D. None

13 April

Q75: Assume that source S and destination D are connected through two intermediate routers labeled R. Determine how many times each packet has to visit the network layer and the data link layer during a transmission from S to D.

A) Network layer – 4 times and Data link layer – 4 times
B) Network layer – 4 times and Data link layer – 3 times
C) Network layer – 4 times and Data link layer – 6 times
D) Network layer – 2 times and Data link layer – 6 times

Q76: Suppose that everyone in a group of N people wants to communicate secretly with the N - 1 others using symmetric key cryptographic system. The communication between any two persons should not be decodable by the others in the group. The number of keys required in the system as a whole to satisfy the confidentiality requirement is

>>N(N-1)/2

Q77 : Choose the best matching:

i) Data link layer

ii) Network layer

iii) Transport layer

A) Ensures reliable transport of data over a physical point-to-point link

B) Encodes/decodes data for physical transmission

C) Allows end-to-end communication between two processes

D) Routes data from one network node to the next

i - A
ii - D
iii - C

Q78: Which one of the following is not a client-server application?

A) Internet chat

B) Web browsing

C) E-mail

D) Ping

Ping is not a software utility

Q79: The protocol data unit (PDU) for the application layer in the Internet stack is

>> The PDU for Data link layer, Network layer, Transport layer and Application layer are frame, datagram, segment and message respectively.

Q80: In the following pairs of OSI protocol layer/sub-layer and its functionality, the INCORRECT pair is

A) Network layer and Routing

B) Data Link Layer and Bit synchronization

C) Transport layer and End-to-end process communication

D) Medium Access Control sublayer and Channel sharing

BIT SYNCHRONIZATION IS PROVIDED BY PHYSICAL LAYER

Q81: Which one of the following uses UDP as the transport protocol?

A) **DNS**
B) HTTP
C) Both
D) None

Q82: Consider the different activities related to email.

- m1: Send an email from mail client to mail server
- m2: Download an email from mailbox server to a mail client
- m3: Checking email in a web browser

Which is the application level protocol used in each activity?

A. m1:HTTP m2:SMTP m3:POP

B. m1:SMTP m2:FTP m3:HTTP

C. **m1:SMTP m2:POP m3:HTTP**

D. m1:POP m2:SMTP m3:IMAP

>> Option c

sending email: smtp

Downloading email: pop

Checking mail in browser: http

Q83: In one of the pairs of protocols given below , both the protocols can use multiple connections between the same client and the server. Which one is that?

A) **HTTP AND FTP**
B) HTTP AND SMTP
C) FTP AND SMTP
D) HTTP AND TELNET

Q84: Which of the following is/are example(s) of stateful application layer protocols?

A) HTTP

B) FTP

C) TCP

D) POP3

Q85: Which one of the following protocols is NOT used to resolve one form of address to another one?

A) DNS
B) ARP
C) **DHCP**
D) NONE

Dynamic Host Configuration Protocol (DHCP) is a network protocol that is used to assign IP addresses and other network configuration parameters to devices on a network

Q86: Identify the correct sequence in which the following packets are transmitted on the network by a host when a browser requests a web page from a remote server, assuming that the host has just been restarted.

A) HTTP GET request, DNS query, TCP SYN

B) DNS query, HTTP GET request, TCP SYN

C) DNS query, TCP SYN, HTTP GET request.

D) TCP SYN, DNS query, HTTP GET request.

Q87: Assume that you have made a request for a web page through your web browser to a web server. Initially the browser cache is empty. Further, the browser is configured to send HTTP requests in non-persistent mode. The web page contains text and five very small images. The minimum number of TCP connections required to display the web page completely in your browser is _______.

Since it is non-persistent mode so n+1 is the total number of connections 5+1=6.

Q88: Which of the following assertions is FALSE about the Internet Protocol (IP)?

A) It is possible for a computer to have multiple IP addresses

B) IP packets from the same source to the same destination can take different routes in the network

C) IP ensures that a packet is discarded if it is unable to reach its destination within a given number of hops

D) the packet source cannot set the route of an outgoing packets; the route is determined only by the routing tables in the routers on the way

Q89: Which of the following is NOT true with respect to a transparent bridge and a router?

A) A bridge uses IP addresses while a router uses MAC addresses

B) A bridge builds up its routing table by inspecting incoming packets

C) A router can connect between a LAN and a WAN

D) Both bridge and router selectively forward data packets

Option 1 is wrong because bridge is not a 3 layer device.

Q90: The address resolution protocol (ARP) is used for:

A) Finding the IP address from the DNS
B) Finding the IP address of the default gateway
C) Finding the IP address that corresponds to a MAC address
D) Finding the MAC address that corresponds to an IP address

ARP is used in finding the MAC address that corresponds to an IP address,

Whereas RARP is used to get IP address from MAC address.

Q91: Suppose that in an IP-over-Ethernet network, a machine X wishes to find the MAC address of another machine Y in its subnet. Which one of the following techniques can be used for this?

A) X sends an ARP request packet to the local gateway's IP address which then finds the MAC address of Y and sends to X

B) X sends an ARP request packet to the local gateway's MAC address which then finds the MAC address of Y and sends to X

C) **X sends an ARP request packet with broadcast MAC address in its local subnet.**

D) X sends an ARP request packet with broadcast IP address in its local subnet.

If target IP address is not in its network, it takes the help of default gateway to resolve MAC address using ARP.

Since in question clearly they have mentioned that (source) and (destination) both are in the same subnet, we need not send ARP request message targeted at gateway and then expect it to give the MAC address of Y to X.

So the correct answer is option C.

Q92: An organization has a class B network and wishes to form subnets for 64 departments. The subnet mask would be?

>> 255.255.252.0

Since we need 6 bits for (2^6=64) subnets +16 bits for class B network.

Q93: For which one of the following reasons does internet protocol(IP) use the time-to-live(TTL) field in IP datagram header?

A) Ensure packets reach destination within that time

B) Discard packets that reach later than that time

C) Prevent packets from looping indefinitely

D) Limit the time for which a packet gets queued in intermediate routers.

>> time-to-leave field is used to prevent packets from looping forever.

Q94: One of the header fields in an IP datagram is the Time to Live (TTL) field. Which of the following statements best explains the need for this field?

A) It can be used to prioritize packets.
B) It can be used to reduce delays.
C) It can be used to optimize throughput.
D) It can be used to prevent packet looping.

>> Only D

Q95: In the IPv4 addressing format, the number of networks allowed under Class C addresses is?

>> For class C address, size of network id is 24 bits. But first 3 bits are fixed as 110 so we can use only 21 bits to create networks, hence total number of networks possible is 2^21.

Q96: Host A (on TCP/IPv4 network A) sends an IP datagram D to host B (also on TCP/IPv4 network B). Assume that no error occurred during the transmission of D. When D reaches B, which of the following IP header field(s) may be different from that of the original datagram D?

A) Checksum
B) TTL
C) Source address

>> all of the above

TTL is decremented by every visited router.

Checksum is also evaluated and updates are done in it.

In fragmentation original datagram is broken into small sized datagrams and hence offset value also changes.

Q97: Which one of the following fields of an IP header is NOT modified by a typical IP router?

A) Checksum
B) TTL
C) Source address
D) Destination address

Only C and D

Checksum is evaluated and updated at every hop to router.

TTL is decremented at every hop to router.

Q98: Consider the following statements about the functionality of an IP based router.

S_1 : A router does not modify the IP packets during forwarding.

S_2 : It is not necessary for a router to implement any routing protocol.

S_3 : A router should reassemble IP fragments if the MTU of the outgoing link is larger than the size of the incoming IP packet.

Which of the above statements true:-

ONLY 2

Since routing is not mandatory , It is not necessary for a router to implement any routing protocol.

Q99: Data sent by sender is 100001111000010

Data read is 100001100000

Possible end delimiter?

A) 100000

B) 10000

A

10000 1 110000 1 0

Q100: The minimum no of bits required for the sequence number if SR protocol is used and the maximum window size is 2048 B?

>>w(r) +w(s) <=sequence number

Log(2 * 2048)

Min 12 bits

Q101: DVR & LSR are ______ domain routing protocol??

Intra domain

Q102

S_1 : DNS can either use TCP OR UDP for its query and response messages

S_2 : HTTP can not use ,multiple TCP connections between the same client and sever

Which of the following are true:-

A. **Only S_1**
B. Only S_2
C. Both S_1 & S_2
D. None

Q103: Different layers have different names of packets due to________?

A) different packet size
B) different header size

Only A

Q104: ______ does not implement any direct error control and flow control protocol??

Internet protocol

Q105

S_1 : offset field in IPV4 packet can be calculated by first byte number divided by 8

S_2 : osi model defines 5 kind off addressing mode

Which of the following are true:-

A. **Only S_1**
B. Only S_2
C. Both S_1 & S_2
D. None

>> OSI model defines 4 kind of addressing modes

Q106

S_1 : the computational overhead in LSR is more as in DVR

S_2 : in DVR split horizon reduces chance of forming loops

Which of the following are true:-

A. Only S_1
B. Only S_2
C. **Both S_1 & S_2**
D. None

Q107

S_1 : dynamic timers are used in TCP

S_2 : dynamic timers are used to avoid congestion and retransmission

Which of the following are true:-

A. Only S_1
B. Only S_2
C. **Both S_1 & S_2**
D. None

Q108: Choose the correct options for channel capacity of pipe that depends upon??

A) propagation delay and transmission delay
B) bandwidth
C) distance between sender and receiver
D) transmission delay

All of the above

Q109: Default route has a subnet mask of ________ in the routing table?

0.0.0.0

Q110: Host specific route has a subnet mask of______?

255.255.255.255

Q111: Broadcast applications uses ____ at transport layer??

UDP

Q112: The pseudo header of ip is used in

A) TCP
B) UDP

Both tcp and udp

Q113: Which addressing system has topological significance?

Logical or network address

Q114

S_1 : an acknowledgment by TCP sender ensures data has been sent/delivered to application layer

S_2 : the growth of congestion window takes place up to receiver's window ahead threshold

Which of the following are true:-

A. Only S_1
B. Only S_2
C. **Both S_1 & S_2**
D. None

Q115: SYN=0 ACK=1 INDICATES______ AND________?

DATA AND ACKNOWLEDGMENT PACKET

Q116

S_1 : less than 10 km comes under MAN

S_2 : less than 100 km comes under WAN

Which of the following are true:-

A. Only S_1
B. Only S_2
C. Both S_1 & S_2
D. None

LAN<10 km

10-100 KM IS MAN

100 KM<WAN

Q117: Optimal window size for sliding window protocol is_?

1+2a

Q118

S_1 : super netting is applicable on ip addresses as well

S_2 : in super netting bits are borrowed from network portion

Which of the following are true:-

A. Only S_1
B. Only S_2
C. **Both S_1 & S_2**
D. None

Q119: A host with ip address 10.100.100.100 wants to use loopback testing what is source IP?

10.100.100.100

Q120: WHAT IS DESTINATION IP IN ABOVE QUESTION?

127.x.x.x

Except 127.0.0.0 & 127.255.255.255

Q121

S_1 : value of MTU depends on the physical network protocol.

S_2 : in TCP the receiving process must pull the data as soon as it is delivered

Which of the following are true:-

A. **Only S_1**
B. Only S_2
C. Both S_1 & S_2
D. None

Q122

S_1 : an ack segment carrying data does not consume sequence number.

S_2 : packet switching is not suitable for real time application.

Which of the following are true:-

A. Only S_1
B. Only S_2
C. Both S_1 & S_2
D. None

Q123

S_1 : syn segment is used for connection establishment , it does not consume a sequence number.

S_2 : fin segment consumes a sequence no.

Which of the following are true:-

A. Only S_1
B. **Only S_2**
C. Both S_1 & S_2
D. None

Q124

S_1 : if a fragmented datagram is lost, the receiver request for entire datagram

S_2 : when a datagram is fragmented the options are not always copied by the fragment

Which of the following are true:-

A. Only S_1
B. Only S_2
C. Both S_1 & S_2
D. None

Q125

S_1 : TCP is transport layer does not receive out of order packet.

S_2 : Pseudo ip header is part of ip header that does not change.

Which of the following are true:-

A. Only S_1
B. **Only S_2**
C. Both S_1 & S_2
D. None

Q126

S_1 : OSI is horizontal approach

S_2 : TCP/IP is vertical approach

Which of the following are true:-

A. Only S_1
B. Only S_2
C. Both S_1 & S_2
D. None

OSI is vertical and TCP/IP is horizontal.

Q127

S_1 : TCP offers half-duplex connection

S_2 : In pipelined connection ,2 RTT are needed for connection establishment and then 1 RTT for all objects.

Which of the following are true:-

A. Only S_1
B. Only S_2
C. Both S_1 & S_2
D. None

Tcp offers full duplex connection.

15 April

Q128: After the k^{th} consecutive collision, each colliding station waits for a random time chosen from the interval in CSMA/CD?

1. $(0 \text{ to } 2^k) \times RTT$
2. $(0 \text{ to } 2^k-1) \times RTT$
3. $(0 \text{ to } 2^k-1) \times$ Maximum Propagation delay
4. $(0 \text{ to } 2^{k-1}) \times$ Maximum Propagation delay

Q129: In a CSMA / CD network running at 1 Gbps over 1 km cable with no repeaters, the signal speed in the cable is 200000 km/sec. What is minimum frame size?

Ans

- Bandwidth = 1 Gbps
- Distance = 1 km
- Speed = 200000 km/sec

Calculating Propagation Delay-

Propagation delay (T_p)

= Distance / Propagation speed

= 1 km / (200000 km/sec)

= 0.5×10^{-5} sec

= 5×10^{-6} sec

Calculating Minimum Frame Size-

Minimum frame size

= 2 x Propagation delay x Bandwidth

= $2 \times 5 \times 10^{-6}$ sec $\times 10^{9}$ bits per sec

= 10000 bits

Q130: A 2km long broadcast LAN has 10^7 bps bandwidth and uses CSMA / CD. The signal travels along the wire at 2×10^8 m/sec. What is the minimum packet size that can be used on this network?

1. 50 B
2. 100 B
3. 200 B
4. None of the above

- Distance = 2 km
- Bandwidth = 10^7 bps
- Speed = 2×10^8 m/sec

Calculating Propagation Delay-

Propagation delay (T_p)

= Distance / Propagation speed

= 2 km / (2×10^8 m/sec)

= 2×10^3 m / (2×10^8 m/sec)

= 10^{-5} sec

Calculating Minimum Frame Size-

Minimum frame size

= 2 x Propagation delay x Bandwidth

= 2×10^{-5} sec x 10^7 bits per sec

= 200 bits or 25 bytes

Q131 : Suppose nodes A and B are on same 10 Mbps Ethernet segment and the propagation delay between two nodes is 225 bit times. Suppose A and B send frames at t=0, the frames collide then at what time, they finish transmitting a jam signal. Assume a 48 bit jam signal.

Propagation delay (T_p) = 22.5 μsec

<u>At t = 0,</u>

- Nodes A and B start transmitting their frame.
- Since both the stations start simultaneously, so collision occurs at the mid way.
- Time after which collision occurs = Half of propagation delay.
- So, time after which collision occurs = 22.5 μsec / 2 = 11.25 μsec.

<u>At t = 11.25 μsec,</u>

- After collision occurs at t = 11.25 μsec, collided signals start travelling back.
- Collided signals reach the respective nodes after time = Half of propagation delay
- Collided signals reach the respective nodes after time = 22.5 μsec / 2 = 11.25 μsec.
- Thus, at t = 22.5 μsec, collided signals reach the respective nodes.

At $t = 22.5\ \mu sec$,

- As soon as nodes discover the collision, they immediately release the jam signal.
- Time taken to finish transmitting the jam signal = 48 bit time = 48 bits/ 10 Mbps = 4.8 μsec.

Thus,

Time at which the jam signal is completely transmitted

= 22.5 μsec + 4.8 μsec

= 27.3 μsec or 273 bit times

Q132: Consider a 10 Mbps Ethernet LAN that has stations attached to a 2.5 km long coaxial cable.Given that the transmission speed is 2.3*10^8 m/s, the packet size is 128 bytes out of which 30 bytes are overhead,find the effective transmission rate and maximum rate at which the network can send data.

Solution:

Maximum rate = throughput =>bandwidth*efficiency

(1/1+6.44 a)*bandwidth

Where a is tp/tt

Effective transmission rate = Throughput*98/100

Q133: An organization requires a range of IP address to assign one to each of its 1500 computers. The organization has approached an Internet Service Provider (ISP) for this task. The ISP uses CIDR and serves the requests from the available IP address space 202.61.0.0/17. The ISP wants to assign an address space to the organization which will minimize the number of routing entries in the ISP's router using route aggregation. Which of the following address spaces are potential candidates from which the ISP can allot any one of the organization ?

(A) I and II only
(B) II and III only
(C) III and IV only
(D) I and IV only

Subnet Mask for given IP address:

202.61.0.0/17
⇒ 11111111 11111111 10000000 00000000
⇒ 255.255.128.0

Now, since we need 1500 hosts, so, bits for host address,

= ceiling (log2 (1500))
= ceiling (10.55)
= 11 bits for host address

So, last 11 bits will for in host addresses:

00000000.00000000 → 00000111.11111111
(0.0 → 7.255)

00001000.00000000 →
00010000.00000000 (8.0 - 15.255)

00001111.11111111 →
00010111.11111111 (16.0 - 23.255)

Sequence is 0, 8, 16, 24, 32, 40, 48, 56, 64, 72, 80, 96, 104, 112, 120.

Hence 64 and 104 is present in sequence so it is the possible IP addresses.

So option (B) is correct.

Q134: Determine the maximum length of the cable (in km) for transmitting data at a rate of 500 Mbps in an Ethernet LAN with frames of size 10,000 bits. Assume the signal speed in the cable to be 2,00,000 km/s.

- 1
- 2
- 2.5
- 5

Data should be transmitted at the rate of 500 Mbps.
Transmission Time >= 2*Propagation Time
=> 10000/(500*1000000) <= 2*length/200000
=> length = 2km (max)
so, answer will be: (B) 2km

Q135: Let G(x) be the generator polynomial used for CRC checking. What is the condition that should be satisfied by G(x) to detect odd number of bits in error?

1. G(x) contains more than two terms
2. G(x) does not divide 1+x^k, for any k not exceeding the frame length
3. 1+x is a factor of G(x)
4. G(x) has an odd number of terms.

Odd number of bit errors can be detected if G(x) contains (x+1) as a factor.

Q136: Consider the data of previous question. Suppose that the sliding window protocol is used with the sender window size of 2^i where is the number of bits identified in the previous question and acknowledgments are always piggybacked. After sending 2^i frames, what is the minimum time the sender will have to wait before starting transmission of the next frame? (Identify the closest choice ignoring the frame processing time.)

A. 16ms
B. 18ms
C. 20ms
D. 22ms

Size of sliding window = 2^5 = 32 Transmission time for a frame = 1ms Total time taken for 32 frames = 32ms Total time = $2t_x + 2t_p$ = 2+50 = 52ms After sending 32 frames, the minimum time the sender will have to wait before starting transmission of the next frame = 52 – 32 = 20

Q137: In Ethernet when Manchester encoding is used, the bit rate is -

A. Half the baud rate.
B. Twice the baud rate
C. Same as the baud rate
D. None of the above

In Manchester encoding, the bitrate is half of the baud rate.

Q138: There are n stations in a slotted LAN. Each station attempts to transmit with a probability p in each time slot. What is the probability that ONLY one station transmits in a given time slot?

A. $(1-p)^{(n-1)}$
B. $np(1-p)^{(n-1)}$
C. $p(1-p)^{(n-1)}$
D. $1-(1-p)^{(n-1)}$

P(X) = Probability that station X attempts to transmit = P P (-X) = Probability that station X does not transmit = 1-P Required is: Probability that only one station transmits = y

Y = (A1, -A2, -A3...... -An) + (-A1, A2, A3......-An) + (-A1, -A2, A3.....-An) + ... + (-A1, -A2, -A3......An) = (p*(1-p)*(1-p)*...... (1-p) + (1-p)*p*(1-p)........(1-p) + ... = p*(1-p)^(n-1) + p*(1-p)^n-1 + ... + p*(1-p)^(n-1) = **n*p*(1-p)^(n-1)**

Q139: The message 11001001 is to be transmitted using the CRC polynomial x^3 + 1 to protect it from errors. The message that should be transmitted is:

A. 11001001000
B. 11001001011
C. 11001010
D. 110010010011

```
>> 11001001 000  <--- input right padded by 3 bits
1001         <--- divisor
01011001 000  <---- XOR of the above 2
 1001         <--- divisor
00010001 000
   1001
00000011 000
      10 01
00000001 010
       1 001
00000000 011 <------- remainder (3 bits)
```

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Q140: In a packet switching network, if the message size is 48 bytes and each packet contains a header of 3 bytes. If 24 packets are required to transmit the message, the packet size is

A. 2 bytes
B. 1 bytes
C. 4 bytes
D. 5 bytes

There are 24 packets and 48 byte of data, So 48 / 24 = 2 byte data for each packet. Header size is 3 byte 2 + 3 = 5 byte will be the size of data packet. So, **option (D)** is correct.

Q141: An analog signal has a bit rate of 8000 bps and a baud rate of 1000. Then analog signal has _____ signal elements and carry _____ data elements in each signal.

A. 256, 8 bits
B. 128, 4 bits
C. 256, 4 bits
D. 128, 8 bits

Analog signal has a bit rate of 8000 bps and a baud rate of 1000. So, each signal will clearly carry bit rate / baud rate bits. i.e. 8000 / 1000 = 8 bits and 2^8 = 256 signal. So, option (A) is correct.

Q142

S_1 : Initial value of checksum is always zero.
S_2 : In one to one mapping for every combination there is unique redundant bit.

Which of the following are true:-

A. Only S_1
B. Only S_2
C. **Both S_1 & S_2**
D. None

Q143

S_1 : Error control + Access control are optional in Computer networking.
S_2 : Checkpointing and routing are mandatory.

Which of the following are true:-

A. Only S_1
B. Only S_2
C. Both S_1 & S_2
D. None

Checkpointing and routing are optional.

Q144

S_1 :TCP/IP is duplex.
S_2 : In wireless communication signals flows in form of electromagnetic wave

Which of the following are true:-

A. Only S_1
B. Only S_2
C. Both S_1 & S_2
D. None

Q145: Which topology provides parent-child hierarchy.

A. **Tree**
B. Mesh
C. Star
D. None

Tree topology provide parent child hierarchy

Q146

S_1 : Every NIC has MAC address.
S_2 : In TCP/IP at DLL CSMA/CD is used.

Which of the following are true:-

A. Only S_1
B. Only S_2
C. **Both S_1 & S_2**
D. None

Q147

S_1 : BAUD RATE = BITRATE in IEEE 802.3
S_2 : In DME one should not start with edge.

Which of the following are true:-

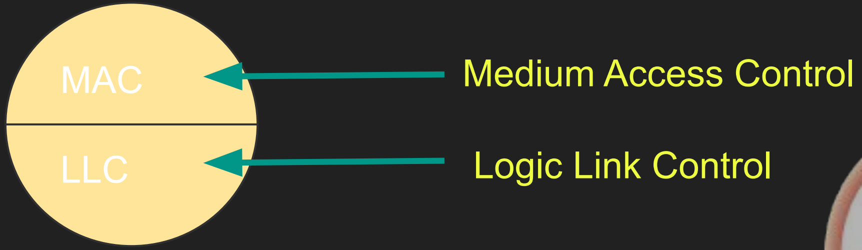
A. Only S_1
B. Only S_2
C. Both S_1 & S_2
D. None

BAUD RATE = 2*BITRATE

Q148: Internally ____ is divided into two layers LLC & MAC, otherwise It is single layer.

A. DLL
B. Physical Layer
C. Both
D. None

Ans: DLL



Q149

S_1 : For variable length packet Ethernet uses length field .
S_2 : Token ring uses End delimiter

Which of the following are true:-

A. Only S_1
B. Only S_2
C. Both S_1 & S_2
D. None

Ethernet uses length field in header

End delimiter such as Bit & Character stuffing is used

Q150

S_1 : Network layer provides Error & Flow control.
S_2 : Switching & Routing is responsibility of network layer.

Which of the following are true:-

A. Only S_1
B. Only S_2
C. Both S_1 & S_2
D. None

Network layer doesn't provide error & flow control.

Q151

S_1 : Both MAC number + IP number are globally unique.
S_2 : Physical address should be unique within network.

Which of the following are true:-

A. Only S_1
B. Only S_2
C. Both S_1 & S_2
D. None

IP address :

Net Id	Host Id

MAC No :

Vendor Id	Date	S.No.

Q152

S_1 : At application layer message body can be of any size.
S_2 : Network layer has various algorithm to control congestion.

Which of the following are true:-

A. **Only S_1**
B. Only S_2
C. Both S_1 & S_2
D. None

Transport layer has various algorithm to control congestion.

Q153: A and B are the only two stations on Ethernet. Each has a steady queue of frames to send. Both A and B attempts to transmit a frame, collide and A wins first back off race. At the end of this successful transmission by A, both A and B attempt to transmit and collide. The probability that A wins the second back off race is ____ .

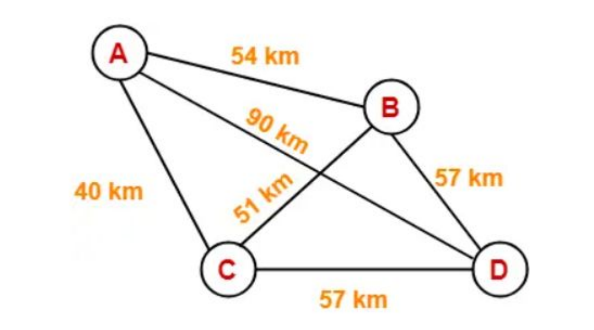
1. 0.5
2. 0.625
3. 0.75
4. 1.0

Station A	Station B	Remark
0	0	Collision
0	1	A wins
0	2	A wins
0	3	A wins
1	0	B wins
1	1	Collision
1	2	A wins
1	3	A wins

From here,

- Probability of A winning the 2^{nd} back off race = 5 / 8 = 0.625.
- Thus, Option (B) is correct.

Q154: The network consists of 4 hosts distributed as shown below-



1. 600 bits
2. 400 bits
3. 6000 bits
4. 1500 bits

In CSMA / CD,

The condition to detect collision is-

Packet size >= 2 x (distance / speed) x Bandwidth

So, we use the values-

- Distance = 90 km
- Speed = 3×10^5 km/sec
- Bandwidth = 1 Mbps

Substituting these values, we get-

Minimum size of data packet

= $2 \times (90 \text{ km} / 3 \times 10^5 \text{ km per sec}) \times 1$ Mbps

= $2 \times 30 \times 10^{-5}$ sec $\times 10^6$ bits per sec

= 600 bits

Thus, Option (A) is correct.

Q155: Suppose nodes A and B are attached to opposite ends of the cable with propagation delay of 12.5 ms. Both nodes attempt to transmit at t=0. Frames collide and after first collision, A draws k=0 and B draws k=1 in the exponential back off protocol. Ignore the jam signal. At what time (in seconds), is A's packet completely delivered at B if bandwidth of the link is 10 Mbps and packet size is 1000 bits.

Given-

- Propagation delay = 12.5 ms
- Bandwidth = 10 Mbps
- Packet size = 1000 bits

Collision occurs at the mid way after time

= Half of Propagation delay

= 12.5 ms / 2

= 6.25 ms

Thus, collision occurs at time t = 6.25 ms.

Collision is discovered in the time it takes the collided signals to reach the nodes

= Half of Propagation delay

= 12.5 ms / 2

= 6.25 ms

Thus, collision is discovered at time t = 6.25 ms + 6.25 ms = 12.5 ms.

After the collision is discovered,

- Both the nodes wait for some random back off time.
- A chooses k=0 and then waits for back off time = 0 x 25 ms = 0 ms.
- B chooses k=1 and then waits for back off time = 1 x 25 ms = 25 ms.
- From here, A begins retransmission immediately while B waits for 25 ms.

- After winning the back off race, node A gets the authority to retransmit immediately.
- But node A does not retransmit immediately.
- It waits for the channel to clear from the last bit aborted by it on discovering the collision.

- Time taken by the last bit to get off the channel = Propagation delay = 12.5 ms.
- So, node A waits for time = 12.5 ms and then starts the retransmission.
- Thus, node A starts the retransmission at time t = 12.5 ms + 12.5 ms = 25 ms.

Time taken to deliver the packet to node B

= Transmission delay + Propagation delay

= (1000 bits / 10 Mbps) + 12.5 ms

= 100 μs + 12.5 ms

= 0.1 ms + 12.5 ms

= 12.6 ms

Thus, At time $t = 25$ ms + 12.6 ms = 37.6 ms, the packet is delivered to node B.

17 April

Topic - Error Control Mechanism

Q156: In error control mechanism what is code word?

A. Data
B. Data + Redundant bits
C. Redundant bits
D. None

Codeword = Data + Redundant bits

Q157: In simple parity check message is 1101. What is the code word?

Redundant bit = 1 bit

$R_0 = a_0 \oplus a_1 \oplus a_2 \oplus a_3$

$R_0 = 1$

Codeword = 11011

Q158: Minimum & Maximum no. of bits error that can be detected by 2D parity is ?

2 bits & 6 bits

Q159: In CRC size of divisor is 'n' bits what will be the size of redundant bits?

Sol : (n-1)

Q160

S_1 : Size of redundant bit by hamming formula is ${}^{m+r}c_d$ +1 <= 2^r

S_2 : In hamming code message is of 4 bits & codeword is of 7 bits.

Which of the following are true:-

A. Only S_1
B. Only S_2
C. **Both S_1 & S_2**
D. None

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Q161: 4 valid codeword 00000 , 01011 , 10101 , 11110. Let minimum hamming distance of code be p & maximum numbers of erroneous bits that can be corrected by the code be q , value of p & q are??

For 2 binary string, hamming distance is no. of ones in XOR of 2 string

Minimum distance = 3

p = 3

Can detect at most ‘d-1’ errors & correct floor[(d-1)/2] errors

Here q = (3-1)/2 = 1

Q162

S_1 : In store and forward technique optimal no. of packets for given data can be calculated as √ [(k-1)*x/h]
Where k is no. of hops, x is data size, h is header size.

S_2 : Class A IP addressing is also called static IP addressing

Which of the following are true:-

A. Only S_1
B. Only S_2
C. **Both S_1 & S_2**
D. None

Q163

Topic - Sliding Window Protocol

S_1 : In GBN, if sender's window size is 1 it becomes stop & wait protocol

S_2 : In GBN window slides when all packets are acknowledged.

Which of the following are true:-

A. **Only S_1**
B. Only S_2
C. Both S_1 & S_2
D. None

In SR protocol window slides when all packets are acknowledged

Q164

S_1 : Stop & wait protocol is better in no. of retransmission when compared to GBN

S_2 : GBN accepts out of order packets.

Which of the following are true:-

A. **Only S_1**
B. Only S_2
C. Both S_1 & S_2
D. None

In GBN receiver's window size is 1 so it accepts only in order packets

Q165

S_1 : In cumulative acknowledgement traffic is high and reliability is high.

S_2 : In Independent acknowledgement traffic & reliability is less..

Which of the following are true:-

A. Only S_1
B. Only S_2
C. Both S_1 & S_2
D. None

Cumulative - Less traffic + Less reliability
Independent - High traffic + High reliability

Q166

S_1 : Minimum (n+1) sequence numbers are required to avoid duplicates in GBN

S_2 : SR Protocol uses Independent acknowledgement

Which of the following are true:-

A. Only S_1
B. Only S_2
C. **Both S_1 & S_2**
D. None

Q167: Which protocol in terms of retransmission behaves like s/w protocol and like GBN , in terms of efficiency?

SR Protocol

Q168: If window size of SR protocol is N then what is the minimum number of sequence number?

2N

Q169

S_1 : Bandwidth requirement of SR Protocol is higher than GBN

S_2 : CPU usage of GBN is more than SR Protocol

Which of the following are true:-

A. Only S_1
B. Only S_2
C. Both S_1 & S_2
D. **None**

GBN => High Bandwidth
SR => More CPU Usage

Q170

S_1 : GBN has less error probability than SR

S_2 : Efficiency of GBN is [N/(1+2a)]

Which of the following are true:-

A. Only S_1
B. Only S_2
C. **Both S_1 & S_2**
D. None

Q171: In time division multiplexing (TDM) time slots are allocated to stations in

A. **ROUND ROBIN MANNER**
B. FCFS
C. SRTF
D. NONE

Q172: Size of time slot in TDM (Time division multiplexing)

A. Tt + 2Tp
B. Tt + Tp
C. Tt + Tp + T polling
D. All of the above

Q173

S_1 : In polling no slot ever gets wasted

S_2 : In polling few stations might suffer from starvation

Which of the following are true:-

A. Only S_1
B. Only S_2
C. **Both S_1 & S_2**
D. None

Since link sharing is not fair as each has equal probability of winning.

Q174

S_1 : CSMA/CD is used at network layer in ethernet

S_2 : CSMA/CD senses only at the point of contact.

Which of the following are true:-

A. Only S_1
B. Only S_2
C. Both S_1 & S_2
D. None

CSMA/CD is used at DLL (data link layer)

Q175

S_1 : In CSMA/CD transmission time >= 2 Tp

S_2 : Jamming signals interfere with data signals.

Which of the following are true:-

A. **Only S_1**
B. Only S_2
C. Both S_1 & S_2
D. None

Jamming signals works on different frequency & don’t interfere.

Q176

S_1 : After undergoing collision, transmitting statement chooses a random number in the range of $[0, 2^{n+1} - 1]$

S_2 : In CSMA/CD if station chooses number k then backoff time is K* RTT.

Which of the following are true:-

A. Only S_1

B. Only S_2

C. Both S_1 & S_2

D. None

For S_1 range is is $[0, 2^n - 1]$

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Q177: Backoff algorithm can be applied for how many stations ______?

>> Back-off algorithm is a collision resolution mechanism which is used in random access MAC protocols (CSMA/CD). This algorithm is generally used in Ethernet to schedule re-transmissions after collisions. If a collision takes place between 2 stations, they may restart transmission as soon as they can after the collision. This will always lead to another collision and form an infinite loop of collisions leading to a deadlock. To prevent such scenario back-off algorithm is used.

Q178: In CSMA/CD if ‘A’ wins next time winning of ‘A’s probability increases exponentially, what is phenomena called?

Capture Effect

Q179: In CSMA/CD efficiency is calculated as 1/(1+x'a') what is the value of x?

6.44

Q180: What does a set of rules define?

A. SMTP
B. FTP
C. IMAP
D. **Protocol**

Q181: What is the maximum efficiency of pure ALOHA?

18.4% at $G=\frac{1}{2}$

Q182: At what value of ‘G’ is maximum efficiency in slotted ALOHA.

At G=1   36.8%

Q183

S_1 : In pure ALOHA any station can transmit the data at any time.

S_2 : In slotted aloha time in globally synchronized

Which of the following are true:-

A. Only S_1
B. Only S_2
C. **Both S_1 & S_2**
D. None

Pure aloha there is no sensor for collision so feedback ACK is required.

Q184

S_1 : GBN uses cumulative ACK.

S_2 : Time out timer >= T_{ACK} time out + 2Tp

Which of the following are true:-

A. Only S_1
B. Only S_2
C. **Both S_1 & S_2**
D. None

Q185

Topic - ISO-OSI Model

18 April

S_1 : In ISO-OSI model there is no concept of testing and abstraction

S_2 : Physical links can be simplex , half-duplex, full duplex

Which of the following are true:-

A. Only S_1
B. Only S_2
C. Both S_1 & S_2
D. None

ISO-OSI model supports divide & conquer, encapsulation, testing & abstraction

Q186

S_1 : If all packets have to be of same length then some data packets may need padding

S_2 : Bit stuffing is more versatile than character stuffing

Which of the following are true:-

A. Only S_1
B. Only S_2
C. **Both S_1 & S_2**
D. None

Q187: Which ISO-OSI layer don’t support error or flow control.

Network layer

Q188 : Match the following:

A) Host to host connectivity

B) Hop to hop

C) End to end connectivity

i) Transport Layer

ii) Network Layer

iii)Data Link Layer

A - ii
B - iii
C - i

Q189

S_1 : Logical addressing is implemented at DLL

S_2 : Physical addressing is implemented at NL

Which of the following are true:-

A. Only S_1
B. Only S_2
C. Both S_1 & S_2
D. None

Logical addressing - NL
Physical addressing - DLL

Q190

S_1 : Transport layer is software layer

S_2 : CSMA/CD is used as error control at TL

Which of the following are true:-

A. **Only S_1**
B. Only S_2
C. Both S_1 & S_2
D. None

TL(transport layer) uses checksum

Q191: Multiplexing and demultiplexing is responsibility of _____?

Transport Layer

Q192: What is data packet at network layer called_____?

Datagram

Q193: Authentication and authorization is provided by?

A. Transport layer
B. **Session layer**
C. Presentation layer
D. A & B

Q194: Encryption and decryption is decided at____?

Presentation layer

->Data Translation

->Data compression

->Encryption decryption

Q195:____ is standard LAN technology for wired LAN’s defined under IEEE 802.3

Ethernet

Q196 : Match the following:

A) Normal Ethernet

B) Fast Ethernet

C) Gigabit ethernet

i) 100 Mbps

ii) 10 Mbps

iii)1 Gbps

A - ii
B - i
C - iii

Q197: Start frame delimiter is added by ______?

Physical Layer

Q198: What is the length of header of physical layers in bits?

8 Byte = 64 bits

Q199: In ethernet what is the size of DLL header?

=>18B

Source MAC = 6B

Destination MAC = 6B

Length = 2B

CRC = 4B

Q200: Maximum length of data in ethernet frame is?

1500B

Q201 : Match the following:

A) Bit Synchronization

B) Message Oriented

C) Byte Stream

i) TCP

ii) UDP

iii)Physical Layer

A - iii
B - ii
C - i

Q202: What is broadcast MAC Address?

255.255.255.255.255.255

Q203

S_1 : Ethernet is Complex & Expensive.

S_2 : Ethernet can't be used for interactive platform.

Which of the following are true:-

A. Only S_1
B. Only S_2
C. Both S_1 & S_2
D. None

Ethernet is simple + cheap

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Q204

S_1 : Ethernet can't be used for client-server architecture.

S_2 : Ethernet can't be used for real time applications.

Which of the following are true:-

A. Only S_1
B. Only S_2
C. **Both S_1 & S_2**
D. None

Q205 : Match the following:

A) Circuit switching

B) Virtual circuit

C) Datagram service

i) Network layer

ii) Physical layer

iii)ATM

A - ii
B - iii
C - i

Q206

S_1 : For bursty data packet, switching is good.

S_2 : For small data packets circuit switching is good.

Which of the following are true:-

A. Only S_1
B. Only S_2
C. Both S_1 & S_2
D. **None**

Bursty data - Circuit switching
Small data - Packet switching

Q207: Minimum length of IPV4 header is _____?

20B

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(Prepared by rankers: Soumya Ratul Hymavati & Divyanshu)

Note: If any doubt in any question post with subject & question number in EPT App.

Q208 : Match the following:

A) ICMP

B) IGMP

C) TCP

D) UDP

i) Unicasting

ii) Connection oriented

iii) Multicasting

iv) Fastness

A - i
B - iii
C - ii
D - iv

Q209 : Match the following:

A) ICMP

B) IGMP

C) TCP

D) UDP

i) 6

ii) 1

iii) 2

iv) 17

A - ii
B - iii
C - i
D - iv

Q210

S_1 : At each hop header checksum is compared with the value contained in this field.

S_2 : Router updates the checksum field whenever it modifies the datagram header

Which of the following are true:-

A. Only S_1
B. Only S_2
C. **Both S_1 & S_2**
D. None

Q211: Maximum how many IP’s can be stored in record route of IPV4 header.

9 (nine)

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Q212

S_1 : Source routing can be both strict and loose.

S_2 : IP services are both unreliable and connectionless.

Which of the following are true:-

A. Only S_1
B. Only S_2
C. **Both S_1 & S_2**
D. None

Q213: Loopback addresses start with ______?

127

Q214

In IP header's version field

S_1 : IPV4 is stored as 0100

S_2 : IPV6 is stored as 0110

Which of the following are true:-

A. Only S_1
B. Only S_2
C. **Both S_1 & S_2**
D. None

19 April

Q215: In a sliding window ARQ Scheme, the transmitter's window size is N and the receiver's window size is M. The minimum number of distinct sequence numbers required to ensure correct operation of the ARQ scheme is

A) Min (M,N)

B) Max (M,N)

C) M+N

D) MN

In sliding window protocol :
Minimum number of sequence number = M+N

Q216: Consider the following message M= 1010001101.The cyclic redundancy check (CRC) for this message using the divisor polynomial $x^5 + x^4 + x^2 + 1$ is :

A) **01110**

B) 01011

C) 10101

D) 10110

Generator polynomial is of degree 5 so append 5 0's to the end of data and then divide new data by generator polynomial $x^5 + x^4 + x^2 + 1 = 110101$

Q217: The message 11001001 is to be transmitted using the CRC polynomial $x^3 + 1$ to protect it from errors. The message that should be transmitted is :

A) 11001001000

B) 11001001011

C) 11001010

D) 110010010011

P(x) = 11001001

divisor D(x) = 1001 and CRC remainder is 011

So the transmitted message is 11001001011

Q218: An error correcting code has the following code words: 00000000, 00001111, 01010101, 10101010,11110000. What is the maximum number of bit errors that can be corrected

A) 0

B) 1

C) 2

D) 3

The maximum hamming distance among the given code words is 8 i.e

$$\begin{array}{r} 01010101 \\ +10101010 \\ \hline 111111111 \end{array}$$

Minimum of all hamming distance is 4.

So, the hamming distance to correct the 'd' errors should be 2d+1.

$$2d+1 = 4$$

$$d \sim= 1$$

Maximum 3 bit errors can be detected.

Q219: Assume that a 12-bit Hamming codeword consisting of 8-bit daa and 4 check bits is $d_8d_7d_6d_5d_4d_3d_2c_4d_1c_2c_1$, where the data bits

and the check bits are given in the following tables:

Data Bits							
d_8	d_7	d_6	d_5	d_4	d_3	d_2	d_1
1	1	0	x	0	1	0	1

Check bits			
c_8	c_4	c_2	c_1
y	0	1	0

Which one of the following choices gives the correct values of x and y?

A) x is 0 and y is 0
B) X is 0 and y is 1
C) X is 1 and y is 0
D) X is 1 and y is 1

1 2 3 4 5 6 7 8
1 0 1 0 x 0 1 1

c_1 c_2 c_4 c_8
0 1 0 y

C_1 = 1 3 5 7 9 11
0 1 0 0 x 1

x=0

1 2 3 4 5 6 7 8 9 10 11 12
0 1 1 0 0 1 0 y x 0 1 1

C_8 = 8 9 10 11 12
0 0 0 1 1

y=0

Q220: consider the cyclic redundancy check (CRC) based error detecting scheme having the generator polynomial $X^3 + X = 1$. Suppose the message $m_4m_3m_2m_1m_0 = 11000$ is to be transmitted.

Check bits $c_2c_1c_0$ are appended at the end of the message by the

transmitter using the above CRC scheme, The transmitted bit string is denoted by $m_4m_3m_2m_1m_0c_2c_1c_0$. The value of the checkbit sequence $c_2c_1c_0$

A) 110

B) 111

C) 100

D) 101

$x^3 + x + 1 = 1011$

$11000000/1011 = 100$

Q221: A host is connected to a department network which is part of a University network. The University network, in turn, is part of the Internet. The largest network in which the Ethernet address of the host is unique is

A) The subnet to which the host belongs
B) The department network
C) The university
D) The internet

Address used in ethernet is MAC address, also known as ethernet address. MAC address of 2 host in any network cannot be same, since MAC address assigned by manufacture in such a way that no two system has same MAC. So largest network will be internet, because MAC of two system always unique

Q222: Consider a simplified time slotted MAC protocol, where each host always has data to send and transmits with probability p = 0.2 in every slot. There is no backoff and one frame can be transmitted in one slot. If more than one host transmits in the same slot, then the transmissions are unsuccessful due to collision. What is the maximum number of hosts which this protocol can support, if each host has to be provided a minimum throughput of 0.16 frames per time slot?

A) 1
B) 2
C) 3
D) 4

Consider 'n' host are possible.
In slotted aloha, only one sender send data.
So, probability of successful transmission

$$=(1-0.2)^{n-1}(0.2)$$

Throughput = 0.16 frame

So, for what value of n, throughput = probability of successful transmission.

$$0.16 = (1-0.2)^{n-1}(0.2)$$

$$(0.8)^1 = (0.8)^{n-1}$$

Comparing powers n-1 = 1

$$n = 2$$

Q223: A and B are the only two stations on an Ethernet. Each has a steady queue of frames to send. Both A and B attempt to transit a frame, collide, and A wins the first backoff race. At the end of this successful transmission by A, both A and B attempt to transmit and collide. The probability that A wins the second backoff race is

A) 0.5
B) 0.625
C) 0.75
D) 1.0

When both stations A and B transmit and collide:

A	B
Sequence No. (0,1)	Sequence No. (0,1)

Probability of A win 1st backoff race = ¼ =0.25
When again A and B transmit and collide

When both stations A and B transmit and collide:

A	B
Sequence No.	Sequence No.
(0,1)	(0,1,2,3)

Probability of A win 2nd backoff race = $\frac{5}{8}$ = 0.625

Q224: Which of the following statements is TRUE about CSMA/CD?

A) IEEE 802.11 wireless LAN runs CSMA/CD protocol
B) Ethernet is not based of CSMA/CD protocol
C) CSMA/CD is not suitable for a high propagation delay network satellite network
D) There is no contention in a CSMA/CD network

IEEE 802.11 wireless LAN run CSMA/CA instead of CSMA/CD, while ethernet uses CSMA/CD.
In CSMA/CD network more one station can transmit data at a same time, hence contention possible.
CSMA/CD is not used for network which has high propagation delay since, efficiency will be very less when collision happens.

Q225: Which of the following statements is FALSE regarding a bridge

A) Bridge is a layer 2 device
B) Bridge reduces collision domain
C) Bridge is used to connect two or more LAN segments
D) Bridge reduces broadcast domain

Bridge is a 2 layer device i.e. work at physical and data link layer. It can reduce collision domain but cannot reduce broadcast domain. Bridge can connect more than 1 LAN.

Note: Hub is neither collision nor broadcast domain separator.

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Q226: In a TDM medium access control bus LAN, each station is assigned one time slot per cycle for transmission. Assume that the length of each tie slot is the time to transmit 100 bits plus end-to-end propagation delay. Assume a propagation speed of $2*10^8$ m/sec. The length of the LAN is 1 km with a bandwidth of 10 Mbps. The maximum number of stations that can be allowed in the LAN so that the throughput of each station can be 2/3 Mbps is

A) 3
B) 5
C) 10
D) 20

Each slot is equal to transmission time of 100 bits + propagation delay.

Propagation delay = 1km/2*10^8 ms = 5 μs.

T_x = 100/10 Mbps = 10 μs.

Let there are maximum N number of station then Length of cycle is = N*(110 +5) = 15N μs.

In a whole cycle each user transmit for only 10 μs.

Therefore efficiency is (10/15N).

Throughput of each station is (10/15N)* 10 Mbps

Which is given as 2/3 Mbps

N = (10*10*3)/(15*2) = 10

Q227: A broadcast channel has 10 nodes and total capacity of 10Mbps. It uses polling for medium access. Once a node finishes transmission, there is a polling delay 80 μs to poll the next node. Whenever a node is polled, it is allowed to transmit a maximum of 1000 bytes. The maximum throughput of the broadcast channel is

A) 1 Mbps
B) 100/11 Mbps
C) 10 Mbps
D) 100 Mbps

Transmission time for one frame

$= 1000\ B/10\ Mbps = 8000/10*10^6$

In polling mechanism, each station involve in polling and one station will be elected to transmit data.

So, total time to transmit frame

$= 800\ \mu\ sec + 80\ \mu\ sec$

$= 880\ \mu\ sec$

Throughput $= (10*800\ \mu\ sec)/(880\ \mu\ sec)$

$=800/88 = 100/11\ Mbps$

Q228: Consider a simple communication system where multiple nodes are connected by a shared broadcast medium (like ethernet or wireless). The nodes in the system use the following carrier sense based medium access protocol. A node that receives a packet to transmit will carrier- sense the medium for 5 units of time . If the node does not detect any other transmission in this duration, it starts transmitting its packet in the next time unit. If the node detects another transmission, it waits until this other transmission finishes, and then begins to carrier- sense for 5 time units again. Once they start to transmit, nodes do not perform any collision detection and continue transmission even if a collision occurs. All transmission last for 20 units of time. Assume that the transmission signal travels at the speed of 10 meters per unit time in the medium.

Assume that the system has two nodes P and Q, located at a distance d meters from each other. P starts transmitting a packet at time t = 0 after successfully completing its carrier- sense phase. Node Q has a packet to transmit at time t = 0 and begins to carrier- sense the medium.

The maximum distance d(in meters, rounded to the closest integer) that allows Q to successfully avoid a collision between its proposed transmission and P's ongoing transmission is _____.

- At time t = 0, station P start transmitting packet (since it already sense the channel free). At the same time station Q sensing the channel to check channel is free or not.
- To Avoid collision: sensing of node Q >= Transmitting a packet

I.e if channel is found free at 5 unit time or more than 5 unit time, station Q data will collide with station P anywhere in middle.

So, distance between P and Q = Sensing of node Q >= transmitting a packet.

D = 5 time unit

D = 5 unit * 10 meter/unit

D = 50 meter

Q229: Consider a network using the pure ALOHA medium access control protocol, where each frame is of length 1000 bits, The channel transmission rate is 1 Mbps (=10^6 bits per second). The aggregate number of transmissions across all the nodes (including new frame transmissions and retransmitted frames due to collisions) is modeled as a Poisson process with a rate of 1000 frames per second, Throughput is defined as the average number of frames successfully transmitted per second. The throughput of the network (rounded to the nearest integer) is ______.

1 frame takes = Tt = L/B.W.

$1000/10^6$ = 1 millisec
1000 frame Tt = 1000 x 1 millisec = 1 sec
In 1 sec, 1000 frames sends, which is millisec per frame.
So, G=1
Efficiency of Pure Aloha = G * e^{-2G}
Where G = Number of requests per time slot willing to transmit
E = Mathematical constant approximately equal to 2.718
So, $\eta = 1 * 2.718^{(-2*1)} = 0.1353$

Therefore, in 1 sec 1000 frames = 0.1353 * 1000

= 135.3 (closest integer) = 135

Throughput -> 135

Q230: IPV4 checksum is applied over?

A) **Header**
B) Header + Data
C) Pseudo IP header
D) TCP Header

Q231: Option field in IPV4 is generally used by.

A) User
B) Organization
C) ISP
D) All of the above

Q232 : Match the following:

A) ARP Request

B) ARP Reply

C) MAC

i) Hardwired on ROM

ii) Broadcast

iii)Unicast

A - iii
B - i
C - ii

Q233: RARP table is:

A) Manual
B) Static
C) **Manual and static**
D) Dynamic

Q234 : Match the following:

A) RARP

B) UDP

C) DHCP

D) TCP

i) Transport layer

ii) Network layer

iii) Reliable

iv) Application layer

A - ii
B - i
C - iv
D - iii

Q235: Relay agents are used in ____?

A) **BootP**
B) DHCP
C) ARP
D) RARP

Q236 : Match the following:

A) BootP client	i) 67
B) BootP servers	ii) 80
C) SMTP	iii) 68
D) HTTP	iv) 25

A - iii
B - i
C - iv
D - ii

Q237

S_1 : There is no ICMP packet for lost ICMP packet.

S_2 : ICMP are application layer protocol

Which of the following are true:-

A. **Only S_1**
B. Only S_2
C. Both S_1 & S_2
D. None

ICMP are network layer protocol

Q238

S_1 : Source quench points towards congestion

S_2 : Echo and Reply are used to check connectivity or working of path

Which of the following are true:-

A. Only S_1
B. Only S_2
C. **Both S_1 & S_2**
D. None

Q239 : Match the following:

A) Routing

B) Flooding

C) Static Routing

D) DVR

i) Non- adaptive

ii) No duplicates

iii) Shortest path guarantee

iv) Adaptive

A - ii
B - iii
C - i
D - iv

Q240 : Match the following:

A) Routing

B) Flooding

C) LSR

D) DVR

i) Least cost tree

ii) Split horizon

iii) Less reliable

iv) High traffic

A - iii
B - iv
C - i
D - ii

Q241: Distance vector routing uses______ and link state routing uses ______.

Bellmanford Algorithm & Dijkstra Algorithm

Q242

S_1 : DVR has fast convergence

S_2 : LSR uses flooding of packets

Which of the following are true:-

A. Only S_1
B. Only S_2
C. Both S_1 & S_2
D. None

DVR has slow convergence

Q243 : Match the following:

A) Local Knowledge

B) Sharing distance vector

C) RIP

D) OSPF

i) DVR

ii) LSR

A - DVR
B - DVR
C - DVR
D -LSR

Q244

S_1 : LSR uses global knowledge

S_2 : LSR uses Bellmanford algorithm

Which of the following are true:-

A. **Only S_1**
B. Only S_2
C. Both S_1 & S_2
D. None

DVR uses Bellmanford algorithm

Topic - Network Security and topology
(For ISRO & BARC)

Q245: What comes under biometric authentication?

A) Fingerprint
B) Pattern Lines of Iris
C) Voice
D) **All of these**

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Q246: Number of tables required in mesh topology for ‘n’ devices.

>>[n(n-1)/2]

Q247

S_1 : Hub is a multiport device.

S_2 : Mesh topology is highly reliable.

Which of the following are true:-

A. Only S_1
B. Only S_2
C. **Both S_1 & S_2**
D. None

Q248

S_1 : Hub is physical layer device

S_2 : Hub is comprised of both hardware and software

Which of the following are true:-

A. Only S_1
B. Only S_2
C. Both S_1 & S_2
D. None

Q249

S_1 : Hub is physical layer device.

S_2 : Hub is comprised of both hardware and software

Which of the following are true:-

A. Only S_1
B. Only S_2
C. Both S_1 & S_2
D. None

Q250: Number of cables in bus topology with ‘n’ nodes is?

>>(n+1)

n -> For devices

1 -> For coaxial ethernet wire

Q251

S_1 : Token ring supports bidirectional flow of messages.

S_2 : Token ring demands for ‘n+1’ wires.

Which of the following are true:-

A. Only S_1
B. **Only S_2**
C. Both S_1 & S_2
D. None

Q252: In which topology out of all devices connected in network, one device does monitoring.What is it?

>> Token ring

Q253

S_1 : Repeaters can amplify the strength of signal

S_2 : Repeaters are 2 port devices

Which of the following are true:-

A. Only S_1
B. Only S_2
C. Both S_1 & S_2
D. None

Q254 : Match the following:

A) Cables	i) Network layer
B) Bridge	ii) Physical layer
C) Router	iii) 2 layered device
D) Modem	iv) Modulator - Demodulator

A - ii
B - iii
C - i
D - iv

Q255: Collision domain for repeater where ‘n’ devices is connected are?

>> Maximum(n)

Q256 : Match the following:

A) Hubs

B) Repeaters

C) Bridges

D) Gateway

i) Security

ii) Multiport repeaters

iii) Can connect 2 LANs

iv) 2 Port

A - ii
B - iv
C - iii
D - i

Q257: Bridge follows _____ to form minimum spanning loss.

>> DUP (Data unit protocol)

Q258: _____ are both broadcast domain operator and collision domain operator.

>> Router

Q259: Proxy firewall is layer_____ device

>> Layer 5

Q260: ______ are intruders that enter as legitimate users.

>> Masqueraders

Q261: ______ are legitimate users which misuses the privilege in IDS

>> **Misfeasor**

Q262: ______ are users internal or external, tries to authority of their supervisor.

>> **Clandestine user**

Q263: ______ are used to trap attackers by providing them virtual interface.

>> Honey pots

Q264: ______ are used by attackers with the intention to take revenge and upset clients of particular service provider

>> DOS (Denial of service) Attack

Q265: Bluetooth is a ________ area network?

A) **Personal**
B) Wireless
C) Local
D) None

Q266: Interior gateway protocol uses ______?

A) RIP
B) **OSPF**
C) MST
D) None

Q267: Exterior gateway protocol uses ______?

A) RIP
B) OSPF
C) **BGP**
D) MST

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Q268: WPA stands for ______?

>> WIFI Protected Access

Q269:______ designed by IETF to provide security at internet layer?

>> **Internet Protocol Security (IPsec)**

Q270

S_1 : If ping encounters error, IEMP message is returned.

S_2 : Radio broadcast is a simplex communication.

Which of the following are true:-

A. Only S_1
B. Only S_2
C. **Both S_1 & S_2**
D. None

Q271: Which of the following is a valid IP address assigned to host?

A) 127.0.0.1
B) 192.248.16.255
C) 25.5.25.55
D) 150.7.0.0

Q272: Given an IP address 156.233.42.56 with subnet mask of 7 bits. How many hosts and subnets are possible?

A) 126 hosts, 510 subnets
B) 128 hosts, 512 subnets
C) **510 hosts, 126 subnets**
D) 512 hosts, 128 subnets

Q273: These are 3 IP addresses as given below:

X = 202.23.14.150
Y = 168.19.200.12
Z = 72.192.52.210

Which of the following statement is correct?

A) X is class A, Y is class B, Z is class C
B) X is class C, Y is class A, Z is class B
C) X is class C, Y is class B, Z is class A
D) X is class A, Y is class C, Z is class B

Q274: An IP router implementing CIDR services a packet with address 131.23.151.76. The routers routing table has the following entries:

Prefix	Output Interface identifier
131.16.0.0/12	3
131.28.0.0/14	5
131.28.0.0/16	2
131.28.0.0/15	1

The identifier of the output interface in which this packet will be forwarded is ___1___.

Q275: In the IPV_4 addressing format, the number of networks allowed under class C addresses is ?

A) 2^{14}
B) 2^{7}
C) 2^{21}
D) 2^{24}

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Q276: Suppose computers A and B have IP addresses 10.105.1.113 and 10.105.1.91 respectively and they both use the same network N. Which of the values of N given below should not be used if A and B should belong to the same network?

A) 255.255.255.0
B) 255.255.255.128
C) 255.255.255.192
D) 255.255.255.224

A's Ip address	10	105	1	01110001
& subnet mask	255	255	255	11100000
O/P network1	10	105	1	01100000

B's Ip address	10	105	1	01011011
& subnet mask	255	255	255	11100000
O/P network1	10	105	1	01000000

O/P network1 = 10.105.1.96

O/P network2 = 10.105.1.64

O/P network1 and O/P network2 belongs to the different network