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COMPUTER NETWORK

COMPUTER SCIENCE & IT

Date of Test : 03/11/2025

ANSWER KEY ➤

1. (c)	7. (c)	13. (b)	19. (d)	25. (d)
2. (b)	8. (b)	14. (a)	20. (b)	26. (d)
3. (c)	9. (c)	15. (a)	21. (d)	27. (b)
4. (d)	10. (b)	16. (c)	22. (b)	28. (a)
5. (a)	11. (b)	17. (b)	23. (b)	29. (c)
6. (b)	12. (a)	18. (d)	24. (b)	30. (d)

DETAILED EXPLANATIONS

1. (c)

IP of block: 128.44.82.16 /25

Subnet mask: 255.255.255.128

Perform 'AND' operation between IP of block and subnet mask to get subnet id.

$$\begin{array}{r}
 128.44.82.16 \\
 255.255.255.128 \\
 \hline
 128.44.82.0
 \end{array}$$

First assigned address to host: 128.44.82.1

Last assigned address to host: 128.44.82.126

128.44.82.0 is subnet id and 128.44.82.127 is direct broadcast address, so cannot assigned to any host.

2. (b)

- Since lost frames are transmitted again and again so to remember which packet reached successfully, sequence number is used.
- RTS frame tells the amount of time data + ACK is transmitted in one go.
- IEEE 802.11 uses CSMA/CA instead of CSMA/CD.
- The exponential backoff mechanism reduces the probability of collision on retransmissions in both ethernet and in IEEE 802.11.

3. (c)

- Hub is the broadcasting device i.e. transmitted data in all direction which can leads to collision.
- Bridge is the collision domain separator i.e. reduced collision domain.
- Switch is the collision domain separator as well as broadcast domain separate.

4. (d)

IP of network: 143.128.67.235 / 20

143.128.01000011.11101011

Last IP address assigned to any host:

143.128.01001111.11111110

3rd octet: 01001111 = 794th octet: 11111110 = 254So, $x \times y = 79 \times 254 = 20066$

5. (a)

We know that for Selective Repeat ARQ $= 2^{n-1} = 128$, $n = 8$

Sequence numbers: 0 to 255, 0 to 255, . . .

$$256 + \frac{144}{\text{sequence number}} = 400$$

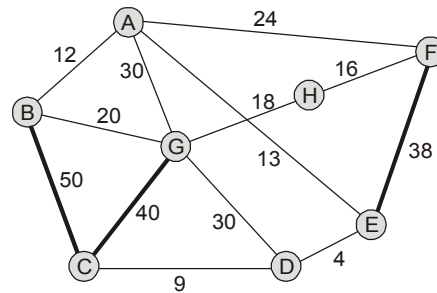
6. (b)

- IPv6 does not have broadcasting concept and fragmentation is done by sender only but in IPv4 fragmentation can be done at intermediate router.
- IPv4 uses checksum as error detecting technique while IPv6 uses CRC extension header as error detecting technique.

7. (c)

- Retransmission Timer is used to retransmit last segments, when either packet lost or ACK lost.
- Persistent Timer is used to deal with a zero-window size deadlock situation.
- Keep alive time is used to prevent long idle connection between two TCP's.
- TCP Time Wait Timer is used during TCP connection termination.

8. (b)



After stabilizing all the routing table linked BC (50), CG (40), EF (38) are not used since to reach B to C path CDEAB is present which has cost 38, to reach C to G path CDG is present which has cost 39 and to reach E to F path EAF is present which has cost 37. So 3 links are not used.

9. (c)

$$\text{Transmission Time } (T_t) \text{ of packet} = \frac{512 \text{ B}}{1 \text{ Gbps}} = 4096 \times 10^{-9} \text{ sec} = 4.096 \text{ } \mu\text{sec}$$

$$\text{Transmission Time } (T_t) \text{ of ACK} = \frac{64 \text{ B}}{1 \text{ Gbps}} = 512 \times 10^{-9} \text{ sec} = 0.512 \text{ } \mu\text{sec}$$

$$\text{Propagation Time } (P_t) = \frac{1000 \text{ m}}{2 \times 10^8 \text{ msec}} = 5 \text{ } \mu\text{sec}$$

So, for maximum utilization:

$$1 = \frac{\text{T.T. (Packet)} \times N}{\text{T.T. (Packet)} + 2P.T. + \text{T.T. (ACK)}}$$

$$\left[\frac{\text{T.T. (Packet)} + 2 \times P.T. + \text{T.T. (ACK)}}{\text{T.T. (Packet)}} \right] = N$$

$$\left[\frac{4.096 + 2 \times 5 + 0.512}{4.096} \right] = N$$

$$\lceil 3.56 \rceil = N$$

$$4 = N$$

10. (b)

- Loss of ACK from client does not effect on termination of connection because client use timeout timer, after it expire it send "ACK" and goes in closed state, where if server does not receive "ACK" then its timer expire and send FIN segment one more time and termination of connection. So True
- Client moves FIN-Wait-1 → FIN-Wait-2 → Timeout → Closed. So False
- Loss of ACK from server does not effect since when client receive FIN from server, then the client understand that "ACK" was lost. So False

11. (b)

$$\text{Bandwidth} = 150 \text{ Mbps}$$

$$\text{Frame size} = 5000 \text{ bytes}$$

$$\begin{aligned} \text{Propagation delay} &= 6 \times 10^4 \mu\text{sec} \\ &= 60 \times 10^{-3} \text{ sec} = 60 \text{ msec} \end{aligned}$$

$$\begin{aligned} \text{So in 1RTT} &= 60 \times 2 \times 10^{-3} \times 150 \times 10^6 \text{ bits} \\ &= 18000 \times 10^3 \text{ bits} \end{aligned}$$

$$\begin{aligned} \text{But maximum bits that can be transferred in one time} &= 100 \text{ frame} \\ &= 5000 \times 8 \times 100 \text{ bits} = 4000000 \text{ bits} \end{aligned}$$

$$\begin{aligned} \text{So, effective bandwidth} &= \frac{4000000}{18 \times 10^6} \times 150 \text{ Mbps} \\ &= \frac{4}{18} \times 150 \times 10^6 \text{ bps} = \frac{600}{18} \times 10^6 \text{ bps} \\ &= 33.33 \text{ Mbps} \end{aligned}$$

12. (a)

- Listen (): Used on server side, cause a bound TCP socket to enter listening state.
- Bind (): Associates a socket with socket address structure.
- Connect (): It assigns a free local port number to a socket. In case of TCP socket, it causes an attempt to establish a new TCP connection.
- Accept (): Accepts a received incoming attempt to create a new TCP connection from the remote client.

13. (b)

Listen system call will keep the server in the passive open state in which it accepts connections from client.

14. (a)

Checksum is calculated at sender side and it is attached to data and transmitted on the channel. The combined value transmitted is known as sender codeword.

When the noise has modified the content on channel, then the calculated checksum will not be equal to received checksum then the codeword is not accepted indicating that there is a error i.e. calculated checksum $\neq$ received checksum.

15. (a)

Given, Data = 10111100
Codeword = $p_1 p_2 1 p_4 0 1 1 p_8 1 1 0 0$
 $P_1 : 1 1 0 1 1 0 \quad p_1 = 1$
 $P_2 : 0 1 1 1 1 0 \quad p_2 = 0$
 $P_4 : 0 0 1 1 0 \quad p_4 = 0$
 $P_8 : 0 1 1 0 0 \quad p_8 = 0$
So 1, 0, 0, 0, is answer.

16. (c)

Maximum Transferable Unit = 500 B
Data bytes that can be transfered in 1 fragment = 500 - 15 = 485

$$\begin{aligned} \text{Number of fragments} &= \left\lceil \frac{3000 - 15}{480} \right\rceil \\ &= \left\lceil \frac{2985}{480} \right\rceil = \lceil 6.218 \rceil = 7 \end{aligned}$$

Since 485 is not divided by 8. So, 480 is sent in one fragment

1st fragment = offset = 0, datagram length = 480 + 15 = 495

2nd fragment = offset = 60, datagram length = 480 + 15 = 495

3rd fragment = offset = 120, datagram length = 480 + 15 = 495

4th fragment = offset = 180, datagram length = 480 + 15 = 495

5th fragment = offset = 240, datagram length = 480 + 15 = 495

6th fragment = offset = 300, datagram length = 480 + 15 = 495

7th fragment = offset = 360, datagram length = 105 + 15 = 120

17. (b)

When all 16 bits becomes all ones is 65535 bytes.

Then all 15 ones followed by 0 is 65534 bytes.

18. (d)

Window size = 40 KB

$$\text{Threshold} = \frac{40}{2} = 20 \text{ KB}$$

Maximum segment size = 2 KB

2 → 4 → 8 → 16 → 20 → 22 → 24 → 26 → 28 → 30 → 32 → 34 → 36 → 37

Time taken to reach 37 KB is 351 = Number of segment × RTT

$$351 = 13 \times \text{RTT}$$

$$\text{RTT} = 27 \text{ ms}$$

19. (d)

Number of address of block are $2^{32-22} = 2^{10}$ addresses

Number of addresses in each subblock = $\frac{1024}{8} = 128$ IP addresses = $232 - 25$ addresses

1st subblock = 96.0/22 96.127/25

2nd subblock = 96.128/22 96.255/25

3rd subblock = 97.0/22 97.127/25

4th subblock = 97.128/22 97.255/25

5th subblock = 98.0/22 98.127/25

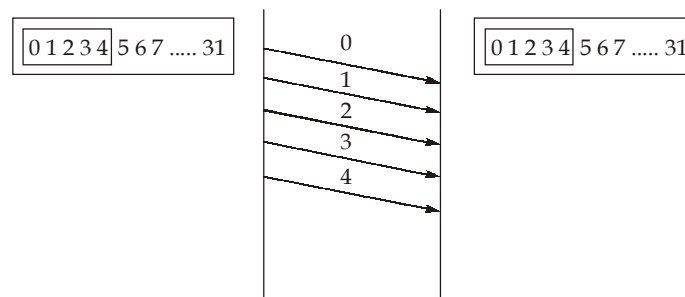
So the first address of 5th subnet id = 201.34.98.1/25

20. (b)

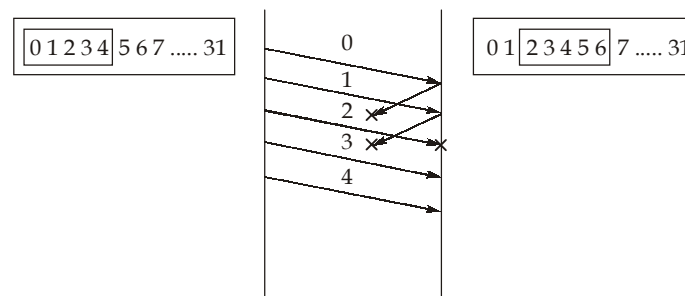
Connect () system call is used by client for putting request for connection establishment then the client will be in active open state.

21. (d)

Before sending



After sending and before time out.



Sender window will be 0, 1, 2, 3, 4 and Receiver window will be 2, 3, 4, 5, 6.

22. (b)

When client is trying to establish a connection to the server, the server is in listening.

State to provide services to different clients.

But when client tries to establish server with unknown port, then connection cannot be established.

When client is sending syn segment with destination port 83, connection cannot be established.

So RST segment is transmitted.

23. (b)

Request made by 500 stations

$$= \frac{500 \times 72}{60 \times 60} \text{ Req/sec}$$

$$= 10 \text{ Req/sec}$$

$$\text{Slot time} = 250 \mu\text{sec}$$

$$1 \text{ slot} = 250 \times 10^{-6} \text{ sec}$$

$$\frac{1}{250 \times 10^{-6}} \text{ slot} = 1 \text{ sec}$$

4000 slot/sec

$$\begin{aligned} \text{Channel load} &= \frac{\text{Number of req/sec}}{\text{Number of slot/sec}} \\ &= \frac{10}{4000} = \frac{1}{400} \times 100 = 0.25 \end{aligned}$$

24. (b)

There is no concept like ideal firewall, every firewall will work according to its design. That is the reason again antivirus software are placed in lan networks even we have hardware firewall outside the LAN.

In case of FTP, before downloading the file, authentication is required and that will be done using control commands like USER, PASS.

SMTP combined with POP3 is known as client to client protocol.

25. (d)

Destination unreachable message will come when link failure is there.

26. (d)

	A	B	C	E		B+2 via B	C+1 via C	E+5 via E			Next hoop	Distance
A	0	2	1	6		4	2	11		A	-	0
B	2	0	4	8		2	5	13		B	B	2
C	1	2	0	7	⇒	4	1	12		C	C	1
D	-	6	9	5		8	10	10		D	B	8
E	5	6	7	0		8	8	5		E	E	5
F	-	5	7	3		7	8	8		F	B	7

27. (b)

S_1 : When a strict routing has been specified by the source but not followed by the intermediate routers, it is reported by ICMP.

S_2 : TCP does not allow the host to send more data than receiver buffer requirement which restrict the data overflow.

S_2 is correct statement.

28. (a)
Client side which sends SYN segment.

29. (c)
System is collision free if only one station is sending data at a time

$$\begin{aligned} P &= {}^8C_1 \times (p)^r \times (q)^{h-r} \\ &= {}^8C_1 \times (0.3)^1 \times (0.7)^7 \\ &= 8 \times 0.3 \times 0.0823 = 0.198 \end{aligned}$$

30. (d)
Block size 178.52.0.0/16
For 510 subnet 9 bit is needed
Subnet Id = 178.52.255.128
From the remaining bits in host ID part will be used for addressing.
First address that can be assign = 178.52.255.129/25
Last address = 178.52.255.254/25

