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COMPUTER NETWORK

COMPUTER SCIENCE & IT

Date of Test : 05/10/2026

ANSWER KEY ➤

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

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. (a)

$$\begin{array}{r}
 100011 \\
 1101 \overline{) 110110000} \\
 \underline{1101} \\
 0001 \\
 0000 \\
 0010 \\
 0000 \\
 0100 \\
 0000 \\
 1000 \\
 1101 \\
 1010 \\
 1101 \\
 111
 \end{array}$$

Hence, the codeword will be 110110111.

3. (b)

$$T_p = 270 \text{ msec} = 270 \times 10^{-3} \text{ sec}$$

$$T_t = \frac{\text{Frame size}}{\text{Bandwidth}} = \frac{1000}{10^6} = 10^{-3} \text{ sec}$$

$$\text{Stop and wait chain utilization} = \frac{T_t}{T_t + 2 \times T_p} = \frac{10^{-3}}{10^{-3} + 2 \times 270 \times 10^{-3}} = 0.0018 = 0.18\%$$

4. (c)

Since the sequence number of the second segment is 110 and first segment is 90.

Here, data in first segment is 20 B.

TCP acknowledgment are cumulative and hence Host B will acknowledge that it has received everything upto and excluding sequence number 90.

5. (c)

Option (c) false as it is possible to give access to specific group of devices using VLAN.

6. (d)

- Distance vector and link state routing are intra-domain routing. Path vector is inter-domain routing protocol.

- In distance vector routing, each node periodically shares its routing table with its neighbour and whenever there is a change.
- Statement is correct.
- OSPF is based on link state routing protocol.
- Statement is correct.

7. (b)

In SR protocol both sender and receiver will have same window size (K in this case).

$$\therefore \text{Total sequence bits are } \log_2(K + K) = \log_2(2K) = \log_2 2 + \log_2 K = 1 + \log_2 K.$$

8. (c)

- Socket is the software interface which is used by process sends/receives messages to/from the network
- To determine the number of hops to a destination and the round trip time for each hop "Traceroute" is used.

9. (b)

If a time out occurs there is a stronger possibility of congestion, hence TCP reacts strongly. It sets the value of threshold to one-half of current window size. Set cwnd to size of one segment and starts slow start phase again.

If three ACKs are received, there is a weaker possibility of congestion, a segment may have been dropped. Hence TCP has a weaker reaction. It sets value of threshold to half of current window size. It sets cwnd to the value of threshold. It starts congestion avoidance phase again.

10. (a)

$$\text{Transmission Time} = 2 \times \text{Propagation Time}$$

$$\frac{\text{Frame size}}{\text{Bandwidth}} = 2 \times \frac{d}{v}$$

$$\frac{64 \times 8 \text{ bits}}{10^8 \text{ bits/sec}} = 2 \times \frac{x}{2 \times 10^8 \text{ m/sec}}$$

$$\Rightarrow x = 512 \text{ meters}$$

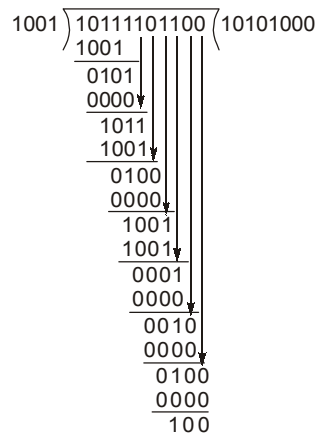
11. (c)

$$\begin{array}{r}
 1001 \overline{) 10011101000} (10001100 \\
 \underline{1001} \\
 0001 \\
 \underline{0000} \\
 0011 \\
 \underline{0000} \\
 0110 \\
 \underline{0000} \\
 1101 \\
 \underline{1001} \\
 1000 \\
 \underline{1001} \\
 0010 \\
 \underline{0000} \\
 0100 \\
 \underline{0000} \\
 100
 \end{array}$$

Received data must be 10011101100.

It shows that there is an error in third bit of the data.

Hence dividing the received data with the generator:



Hence option (c) is correct.

12. (c)

Option (a):

4th octet for subnet : 1 → 0 0000000 ... (1)

4th octet for subnet : 2 → 10 000000

4th octet for subnet : 3 → 01 000000 ... (2)

Comparing 1 and 2, address 01001000 can belong to both the subnets, hence subnet division is wrong.

Option (b):

4th octet for subnet : 1 → 1 0000000 ... (3)

4th octet for subnet : 2 → 11 000000 ... (4)

4th octet for subnet : 3 → 00 000000

(Comparing 3 and 4, address 11010000 can belong to both the subnets, hence subnet division is wrong).

Option (d): In first octet, there are just 6 bits for host, which can give maximum 61 addresses, hence 125 interfaces are not possible.

Option (c):

4th octet for subnet : 1 → 1 0000000

4th octet for subnet : 2 → 00 000000

4th octet for subnet : 3 → 01 000000

Hence, option (c) is correct.

13. (d)

Option (a): Since the second octet is 00011100, hence 88 and 87 not possible.

Option (b): Same as option (a) 38 and 39 not possible for second octet.

Option (c): The octets are possible, but number of host possible are $\{2^{10} - 2\} = 1022$, hence it's incorrect.

14. (c)

Minimum distance will be after stabilizing of all tables.

i.e. $R_1 - R_4 - R_6 - R_3 = 4 + 2 + 1 = 7$

15. (c)

- 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.
- Close (): It terminates the connection.
- Socket (): Creates a new socket of certain socket type.
- Poll (): Used to check on the state of a socket.
- Accept (): Accepts a received incoming attempt to create a new TCP connection from the remote client.

16. (b)

To	Next Hop	Distance
P	–	0
Q	Q	3
R	Q	4
S	S	2
T	S	6
U	S	4

$$[P \rightarrow Q = 3]$$

$$[P \rightarrow Q \rightarrow R = 3 + 1 = 4]$$

$$[P \rightarrow S = 2]$$

$$[P \rightarrow S \rightarrow T = 2 + 4 = 6]$$

$$[P \rightarrow S \rightarrow U = 2 + 2 = 4]$$

17. (a)

For stop and wait

Data rate $r = 5000 \text{ bps}$

Propagation delay $T_p = \frac{\text{Distance}}{\text{Speed}}$

$$= \frac{60 \times 10^3 \text{ meters}}{4 \times 10^6 \text{ meters}} \text{sec} = 15 \text{ msec}$$

Utilization (U) = 60%

Bandwidth (B) = 5000 bps

Frame size $F = ?$

$$U = 60\%$$

Transmission delay $T_t = \frac{F}{B}$

$$\Rightarrow 0.6 = \frac{T_t}{T_t + 2T_p} = \frac{1}{1 + 2\frac{T_p}{T_t}}$$

$$\Rightarrow 0.6 = \frac{1}{1 + \frac{2 \times 15}{F} \times 5}$$

$$\Rightarrow F = 225 \text{ bits}$$

18. (c)

IP datagram size = 2000 B

MTU = 100 B

IP header size = 20 B

So, each packet will have 20 B header + 80 B payload

Therefore, $80 \times 25 = 2000$

So, total 25 fragments required.

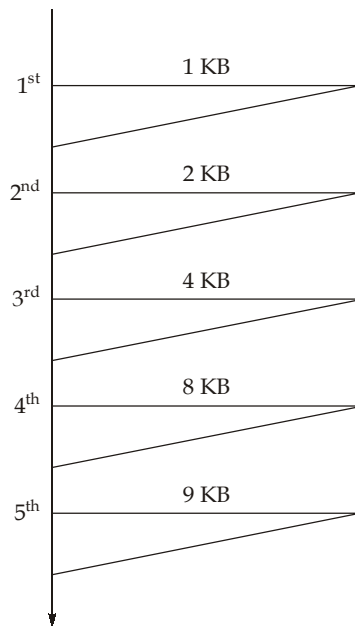
19. (c)

In TCP congestion avoidance if a timeout occurs.

- It sets the value of the threshold to one-half of the cwnd size

$$\text{So, } \frac{18 \text{ KB}}{2} = 9 \text{ KB}$$

- It set cwnd to the one segment.
- Slow-start will be applied. Since, next four transmission are all successful.

∴ 1st transmission : 1 segment, 1 KB2nd transmission : 2 segment, 2 KB3rd transmission : 4 segment, 4 KB4th transmission : 8 segment, 8 KB

After these four successful transmissions, the window size is supposed to be 16 KB, however since the threshold size is 9 KB, the window can only be 9 KB.

20. (c)

Block size = 190.76.255.1/16

Number of subnets to be created = 10

Subnet Id = 190.76.255.192

Now, the remaining 8 bits of 4th octet will be used for addressing.

Hence, the first address will be 190.76.255.193/26

and the last address will be 190.76.255.254/26.

21. (a)

For pure aloha maximum throughput is 18.4%

For slotted aloha maximum throughput is 36.8%

$$\therefore \text{Pure aloha} = \frac{18.4}{100} \times 800 = 147.2 \text{ Kbps}$$

$$\therefore \text{For slotted Aloha} = \frac{36.8}{100} \times 800 = 294.4 \text{ Kbps}$$

22. (a)

Subnet mask is 255.255.255.224

(i) $62 \Rightarrow 001 \ 11110 \Rightarrow$ Last host
 $\quad \quad \quad \longleftrightarrow \quad \longleftrightarrow$

(ii) $94 \Rightarrow 010 \ 11110 \Rightarrow$ Last host
 $\quad \quad \quad \longleftrightarrow \quad \longleftrightarrow$

(iii) $127 \Rightarrow 011 \ 11111 \Rightarrow$ Direct broadcast address
 $\quad \quad \quad \longleftrightarrow \quad \longleftrightarrow$

(iv) $191 \Rightarrow 101 \ 11111 \Rightarrow$ Direct broadcast address
 $\quad \quad \quad \longleftrightarrow \quad \longleftrightarrow$

23. (d)

$$\text{Total data} = 30 \times 8 \text{ Mb}$$

$$\text{Time for computer to transmit data} = \frac{30 \times 8 \text{ Mb}}{6 \text{ Mb}} \text{ sec} = 40 \text{ sec}$$

Maximum transmission rate = 4 Mbps.

Actual data sent on network in 40 sec

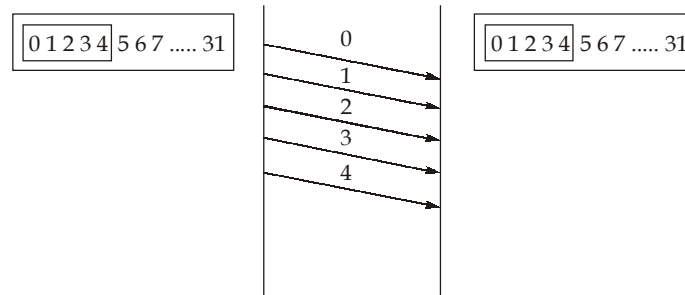
$$= 4 \text{ Mbps} \times 40 = 160 \text{ Mb} = 20 \text{ MB}$$

$$\text{Bucket size} = 30 \text{ MB} - 20 \text{ MB} = 10 \text{ MB}$$

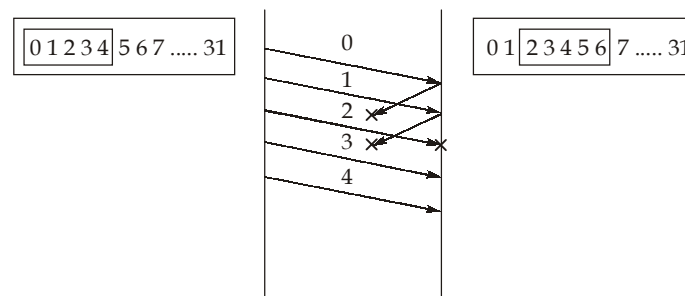
24. (a)

- 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.

25. (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.

26. (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
27. (c)
- In slow start phase, sender doubles its window size every RTT if all sent packets were acknowledged.
 - After detecting packet loss through a timeout. TCP reset its window size to 1 MSS.
 - In congestion avoidance state, sender increase its window size by 1 MSS instead of one packet (Packet) for every RTT.

28. (d)

29. (d)

30. (b)

$$t = \frac{C}{M - \rho}$$

Where

C : Capacity of token bucket

ρ : Token generation rate

M : Maximum data rate of token bucket

t = time for which token bucket can send the data with maximum data rate.

So,

$$t = \frac{2 \times 10^6 \text{ bytes}}{16 \times 10^6 \text{ bytes/sec.} - 8 \times 10^6 \text{ bytes/sec}}$$

$$t = \frac{2}{8} = 0.25 \text{ sec}$$

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