CLASS TEST

S.No. : 01 SK_CS_ABCDE_250822

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COMPUTER NETWORK

COMPUTER SCIENCE & IT

Date of Test : 25/08/2022

ANSWER KEY ➤

1.	(c)	7.	(b)	13.	(d)	19.	(d)	25.	(d)
2.	(a)	8.	(c)	14.	(d)	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.	(d)	11.	(c)	17.	(a)	23.	(d)	29.	(d)
6.	(d)	12.	(c)	18.	(d)	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.

128.44.82.16
255.255.255.128
128.44.82.0

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)

```
          100011
      ____________
1101 ) 1101100000 (
       1101
       ----
        0001
        0000
        ----
         0010
         0000
         ----
          0100
          0000
          ----
           1000
           1101
           ----
            1010
            1101
            ----
             111
```

Hence, the codeword will be 110110111.

3. (b)

- POP3 and $IMAP_4$ are well known pull protocols used between receiver's client and mail server.
- In Web Based Protocol, HTTP is work as push and pull protocol.
- SMTP is well known push protocol, it cannot be used between receiver's client and mail server.

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. (d)

UDP receiver can't be absolutely sure that no bit errors have occurred. Because as per the checksum calculation mechanism, if the corresponding bits of two 16 bit words in the packet were 0 and 1, then even if these get flipped to 1 and 0 respectively, the sum still remains the same. Hence the 1's complement, the receiver calculate is also same.

Hence, checksum gets verified, even when there was actually an error during transmission. TCP also uses the same checksum mechanism. Hence the statement will hold true for TCP also.

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).

$\therefore$ 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)**

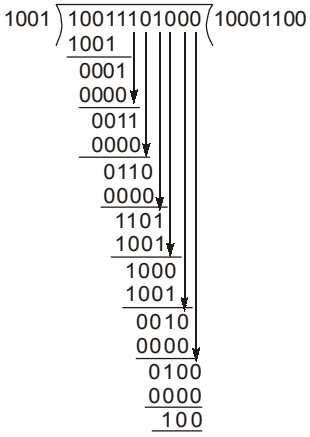
$$\text{Transmission Time} = 2 \times \text{Propagation Time}$$

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

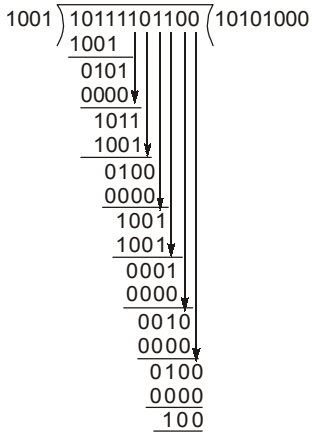
$$\frac{64 \times 8\ bits}{10^8\ \text{bits/sec}} = 2 \times \frac{x}{2 \times 10^8\ \text{m/sec}}$$

$\Rightarrow$ $x = 512$ meters

11. **(c)**



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):

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

4^{th} octet for subnet : 2 → 10 000000

4^{th} 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):

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

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

4^{th} 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):

4^{th} octet for subnet : 1 → 1 0000000

4^{th} octet for subnet : 2 → 00 000000

4^{th} 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. (d)

- TCP involves a connection establishment phase while UDP does not. Using TCP for DNS may end up involving several TCP connections to be established since several name server may have to be contacted to translate a name into an IP address. This imposes a high overhead in delay. Hence DNS uses UDP for its query and response messages.
- SMTP is a push protocol, whereas the given task is pull operation.
- S_3 and S_4 statements are correct.

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	[P → Q = 3]
R	Q	4	[P → Q → R = 3 + 1 = 4]
S	S	2	[P → S = 2]
T	S	6	[P → S → T = 2 + 4 = 6]
U	S	4	[P → S → U = 2 + 2 = 4]

17. (a)

For stop and wait

Data rate $r = 5000$ bps

Propagation delay $T_P = \dfrac{\text{Distance}}{\text{Speed}}$

$$= \frac{60\times10^3 \text{ meters}}{4\times10^6 \text{ meters}}\text{sec} = 15 \text{ msec}$$

Utilization $(U) = 60\%$

Bandwidth $(B) = 5000$ bps

Frame size $F = ?$

$U = 60\%$

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

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

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

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

18. (d)

Frame header are the headers attached at DLL. Since fragmentation is at network layer. Hence
MTU for A-R_1 $\rightarrow$ 1010 B
MTU for R_1 – R_2 $\rightarrow$ 504 B
MTU for R_2-B $\rightarrow$ 500 B
Total IP packet size $\rightarrow$ 940 B [920 B + 20 B]

Link A-R_1:
Length = 940, DF = 0, MF = 0, Offset = 0 [920 B + 20 B]

Link R_1 – R_2:
1. Length = 500, DF = 0, MF = 1, Offset = 0 [480 B + 20 B]
2. Length = 460, DF = 0, MF = 0, Offset = 60 [440 B + 20 B]

Link R_2 -B:
1. Length = 500, DF = 0, MF = 1, Offset = 0 [480 B + 20 B]
2. Length = 460, DF = 0, MF = 0, Offset = 60 [440 B + 20 B]

19. (d)

Considering each statements,
- SMTP is text-based protocol and MIME extension helps in sending graphics and multimedia. POP3 and IMAP4 are used for retrieving information from server, they do not help SMTP to send multimedia.

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 4^{th} 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%

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

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

22. (a)

Subnet mask is 255.255.255.224

(*i*) $62 \Rightarrow \underset{\longleftrightarrow}{001}\ \underset{\longleftrightarrow}{11110} \Rightarrow$ Last host

(*ii*) $94 \Rightarrow \underset{\longleftrightarrow}{010}\ \underset{\longleftrightarrow}{11110} \Rightarrow$ Last host

(*iii*) $127 \Rightarrow \underset{\longleftrightarrow}{011}\ \underset{\longleftrightarrow}{11111} \Rightarrow$ Direct broadcast address

(*iv*) $191 \Rightarrow \underset{\longleftrightarrow}{101}\ \underset{\longleftrightarrow}{11111} \Rightarrow$ Direct broadcast address

23. (d)

Total data = 30 × 8 Mb

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

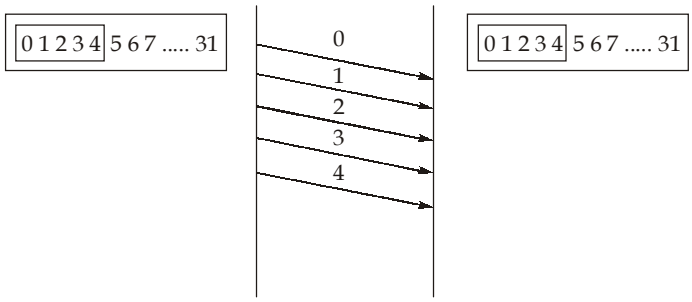
Maximum transmission rate = 4 Mbps.
Actual data sent on network in 40 sec
= 4 Mbps × 40 = 160 Mb = 20 MB
Bucket size = 30 MB – 20 MB = 10 MB

24. (a)

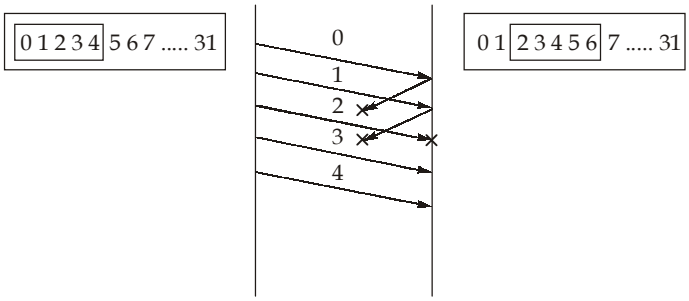
- Listen ( ): Used on server side, cause a bound TCP socket to enter listening state.
- Bind ( ): Associates a socket with socket address structure.
- Connect ( ): It assigns a free local port number to a socket. In case of TCP socket, it causes an attempt to establish a new TCP connection.
- Accept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

- Count to infinity problem in distance vector routing protocol arise when network gets disconnected. But this problem doesnot occur in such cases when the network not get disconnected.
- To make distance vector routing protocol coverage without count to infinity problem, enhancement to distance vector routing protocol is used i.e. path vector routing.

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,
$$t = \frac{2\times10^6\ bytes}{16\times10^6\ bytes/\sec. - 8\times10^6\ bytes/\sec}$$

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

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