CLASS TEST

S.No.:02SK_CS_CDFGHI_231023

MADE EASY

India's Best Institute for IES, GATE & PSUs

Delhi | **Bhopal** | **Hyderabad** | **Jaipur** | **Pune** | **Bhubaneswar** | **Kolkata**

Web: www.madeeasy.in | **E-mail:** info@madeeasy.in | **Ph:** 011-45124612

COMPUTER NETWORK

COMPUTER SCIENCE & IT

Date of Test : 23/10/2023

ANSWER KEY

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

DETAILED EXPLANATIONS

3. (c)

In computer, networking splint-horizon route advertisement is a method of preventing routing loops in distance-vector routing protocol by prohibiting a router from advertising a route back onto the interface from which it was received.

6. (a)

"If a datagram is found to be larger than the allowable byte size for network packets, the IP breaks up the datagram into fragments and sends each fragment as an IP packet. When fragmentation does occur, the IP duplicates the source address and destination address into each IP packet, so that the resulting IP packets can be delivered independently of each other. The fragments are reassembled into the original datagram by the IP on the receiving host and then passed on to the higher protocol layers." Note that each network can have a different maximum transmission unit (MTU).

11. (a)

Although the first parity bit can detect even-numbered bits and the second parity bit can detect odd-numbered bits, this coding scheme can only detect ALL single error for sure, that is, $d = 1$. Therefore, the Hamming distance is $d + 1 = 2$. Although it can sometimes detect 2 errors (one even-numbered, one odd-numbered), it cannot detect all the 2 errors.

12. (a)

Convert the dotted-quad IP addresses and mask to 32-bit unsigned integers and AND each address with the mask. If the results are the same, they're in the same subnet.

14. (c)

When a time-out occurs, three things happened. First, slow start will be initiated. Second, the congestion window would start at 1. Third, the threshold will be reset to 18 KB/2 = 9 KB. If the next four transmission are all successful, then

- 1^{st} transmission : 1 segment, 1 KB
- 2^{nd} transmission : 2 segments, 2 KB
- 3^{rd} transmission : 4 segments, 4 KB
- 4^{th} transmission : 8 segments, 8 KB

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

15. (b)

Here we have a window size of N = 3. Suppose the receiver has received packet $k - 1$, and has ACKed that and all other preceding packets. If all of these ACK's have been received by sender, then sender's window is $[k, k + N - 1]$. Suppose next that none of the ACKs have been received at the sender. In this second case, the sender's window contains $k - 1$ and the N packets up to and including $k - 1$. The sender's window is thus $[k - N, k - 1]$. By these arguments, the senders window is of size 3 and begins somewhere in the range $[k - N, k]$.

16. (c)

As start deliminator contain 3 consecutive 1's so during bit stuffing as soon as two consecutive 1's encounter one zero is stuffed.

18. (c)

$$\text{Minimum frame size} = 2t_p \times \text{bandwidth}$$

t_p : Propagation delay.

$2 \times 25.6 \times 10^{-6} \times 10^6$

19. (b)

The Hamming distance between two bit strings is the number of bits that would have to flip to make the strings identical.

Consider a single bit flip, This could turn 001 into 011, for example. If both 001 and 011 are valid strings, then there is no way to detect that an error occurred when 011 is observed. So strings must differ by at least 2 bits in order for 1 bit errors to be detectable. In general, to detect d errors requires a minimum Hamming distance of $d + 1$.

However, just detecting a bit flip does not necessarily make it feasible to figure out what the original value was. If both 001 and 100 are valid bit strings, but 101 is observed, how is the observer to know whether an 001 or a 100 was intended? In order to correct a bit error, the minimum necessary Hamming distance is 3 bits. So, for example, if only 111 and 000 are valid, but an 001 arrives, then the receiver can correct this to 000 under the assumption that only one bit flipped. Correcting d bit flips requires a minimum Hamming distance of $2 * d + 1$.

There is no way to prevent bit flips by adjusting the Hamming distance.

20. (c)

Repeater – Physical layer
Bridge – Data link layer
Gateway – All layers
Router – Network layer

21. (a)

$$\text{Sender window size} = 15$$

For Go-Back-n $\quad 2^n - 1 = 15$

$\Rightarrow \quad 2^n = 16$

$\Rightarrow \quad n = 4$ bits

For selective repeat

$$2^{n-1} = 15$$

$\Rightarrow \quad n = 5$ bits

22. (d)

$$\text{Node throughput} = 50 \text{ frames/sec}$$

$$\text{System throughput} = 100 \times (\text{node throughput})$$

$$= 100 \times 50 = 5000 \text{ frames/sec}$$

$$\text{Maximum system rate} = \frac{10^8 \text{ bps}}{2500 \text{ bits}} = \frac{\text{Transmission rate}}{\text{Average frame length}} = 40000 \text{ frames/sec}$$

$$\text{Efficiency} = \frac{5000}{40000} = \frac{\text{System throughput}}{\text{Max system rate}} = 0.125 = 12.5\%$$

© Copyright: MADE EASY

23. (a)

Utilization for any sliding window protocol is

$$\eta = \frac{W}{1+2a}, \text{ where } W \text{ is window size of the sender and}$$

$$a = (\text{Propagation delay/Transmission delay})$$

For STOP and WAIT protocol window size of sender = 1

Hence
$$\eta = \frac{1}{1+2a} = \frac{1}{1+2\left[\frac{16\,\text{ms}\times 10^6}{2\times 10^3\times 8}\right]} = \frac{1}{1+2[1]} = 33.33\%$$

24. (a)

In the slow start algorithms, the size of the congestion window increases exponentially until it reaches a threshold, after this there is additive increases (one-one window) till the time outs. Statement (iii) is false.

25. (b)

→ CRC polynomial is the divisor and the message is dividend. The remainder is added to the message and then it is send.

→ CRC is always 1 bit < divisor

```
1101 ) 100100000 ( 111101
       1101
       -----
Discard ← 01000
        1101
        -----
Discard ← 01010
         1101
         -----
Discard ← 01110
          1101
          -----
Discard ← 00110
           0000
           -----
Discard ← 01100
            1101
            ----
Discard ← 0001
```

Message = 100100 001

26. (a)

from \ to	A	B	C	D
A	0	6	4	3
C	4	2	0	1
D	3	3	1	0

∴ Option (a) is correct.

27. (c)

- In redirection packet is not discarded but it is redirected to a n/w as the host doesn't belong to this network.
- In source quench packet is discarded due to congestion in the n/w.
- Destination unreachable means host is not present in the n/w or the host is not responding to the request, then the packet is discarded.

28. (c)

Number of subnets = 1024

Bits required for subnet = 10

Network mask = 255.255.255.192

Number of hosts/subnet = $2^6 - 2$

Ranges are:

190.76.0.0/26 to 190.76.0.63/26	------	1st subnet
190.76.0.64/26 to 190.76.0.127/26	------	2nd subnet
190.76.0.128/26 to 190.76.0.191/26	------	3rd subnet
190.76.0.192/26 to 190.76.0.255/26	------	4th subnet
190.76.1.0/26 to 190.76.1.63/26	------	5th subnet
	⋮	
190.76.255.128/26 to 190.76.255.191/26	------	1023th subnet
190.76.255.192/26 to 190.76.255.255/26	------	1024th subnet

29. (d)

For station A (at network layer) : Total data is 1400 bytes

At network 2

$$\text{MTU} = \text{Data} + \text{Header}$$

or,

$$\text{Data} = \text{MTU} - \text{Header}$$

$$= 620 - 20 = 600 \text{ Bytes}$$

As 600 is divisible by 8 it is taken as it is.

$$\text{Number of fragments } (n) = \frac{\text{Total data size}}{\text{Actual data size used}}$$

$$n = \frac{1400 \text{ Bytes}}{600 \text{ Bytes}} = 2.33$$

$\therefore$ Take it as 3 fragments:

1st fragment data $\rightarrow$ 600 Bytes $\boxed{20}\boxed{600}$ 1st packet

2nd fragment data $\rightarrow$ 600 Bytes $\boxed{20}\boxed{600}$ 2nd packet

3rd fragment data $\rightarrow$ 200 Bytes $\boxed{20}\boxed{200}$ 3rd packet

Total data size transmitted to destination = 1460 Bytes.

© Copyright: MADE EASY

30. (b)

(i) Calculate RTT

$$\text{RTT} = 2 \times 3000 \times 6\ \mu\text{sec} = 36\ \text{m sec}$$

(ii) In 1 sec — 1.536×10^6 bits are covered

∴ In 36 m sec — $36 \times 10^{-3} \times 1.536 \times 10^6$ bits

= 55296 bits are covered

(iii)
$$\text{Sequence number} = \frac{55296 \text{ bits}}{64 \times 8 \text{ bits (frame length in bits)}} = 108$$

(iv)
$$2^k = 108$$

$$\Rightarrow \quad k = \log_2(108) \simeq 7$$

∴ Sequence number contains 7 bits.

■■■■