S.No. : 02 BS1_CS_A_220619

Computer Network

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CLASS TEST 2019-2020

COMPUTER SCIENCE & IT

Date of Test : 22/06/2019

ANSWER KEY ➤ Computer Network

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

Detailed Explanations

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

2. (c)

Repeater are used at physical layer.
Bridge are used at data link layer.
Gateway are used at all layers.
Router are used at network layer.

3. (c)

Options (a), (b) and (d) are correct statements.

HTTP server maintains no information about clients, such HTTP server is said to be Stateless.

$\therefore$ Option (c) is incorrect statement.

4. (d)

Option (a) : Error Checking is only for header part.
Option (b) : There is no acknowledgment for packets reaching the destination.
Option (c) : IP has minimal error control and there is no concept of error correction for IP datagram.
All the options are correct.

5. (b)

127.0.0.1 – Loop back address for testing.

255.255.255.255 – Limited broadcast for local network.

239.127.255.255 – Class D address for multicast.

0.0.0.0 – Computer address for bootstrap.

6. (c)

For shared channel average requests for 10,000 stations

$$= \frac{10^4 \times 36}{60 \times 60} \text{ requests/sec} = 10^4 \times \frac{1}{100}$$

$$= 100 \text{ requests/sec}$$

$$\text{Slot time} = 100\ \mu\text{sec}$$

$$1 \text{ slot} — 100 \times 10^{-6} \text{ sec}$$

$$\frac{1}{100 \times 10^{-6}} \text{ slots} — 1 \text{ sec}$$

$\Rightarrow$ $$\text{Number of slots} = 10{,}000 \text{ slots/sec}$$

$$G = \text{Channel load} = \frac{\text{No. of requests/sec}}{\text{No. of slots/sec}}$$

$$= \frac{100}{1000} = \frac{1}{100}$$

7. (c)
Data link control is part of data link layer used for services like flow control, error detection and error correction.
So, more appropriate answer is data link control.

8. (b)

$$\frac{6000 \text{ bit}}{30 \times 10^6 \text{ bits/sec}} = \frac{2 \times L}{3 \times 10^5 \text{ km/sec}}$$

2×10^{-5} sec $\times$ 3×10^5 km/sec $= 2 \times L$

$$L = 3 \text{ km}$$

9. (b)
Each frame has a chance of 0.8 of getting through, the chance of whole message getting through is $(0.8)^{20}$ which is about 0.0115.

The mean number of transmission $= \frac{1}{P}$

$$= \frac{1}{0.0115} = 86.95$$

10. (c)
UDP and TCP are transport layer protocol. TCP supports electronic mail.

11. (b)
242.20.51.200/28
255.255.255.240

$$240 \rightarrow \underbrace{1111}\,0000$$
$$200 \rightarrow \underbrace{1100}\,1000$$

Network Id

$$\text{First IP} \rightarrow \underbrace{1100}\,0001$$
$$\vdots$$
$$\text{Last IP} \rightarrow \underbrace{1100}\,1110$$

i.e. last IP is 242.20.51.206
$\therefore$ 206 is the fourth octet of the last IP address.

12. (a)

One way delay = 10 msec
One window can be sent = $2 \times$ PT = RTT = 40 msec
One window — 20 millisec
One window — 40×10^{-3} sec

$$\frac{10^3}{40} \Leftarrow 1\text{sec}$$

$\Rightarrow$ 25 windows/sec
$\Rightarrow$ 250×65535 bytes/sec
$\Rightarrow$ 1638375 bytes/sec

Maximum data rate = 1.638375×8 Mega bits/sec
= 1.638375×8 Mega bits/sec [$\because$ 1 byte = 8 bits]

$$\text{Line efficiency} = \frac{13.107 \text{ Mbps}}{512 \text{ Mbps}} = 0.0255$$

$$\text{in } \% = 0.0255 \times 100 = 2.5$$

13. (c)

For station A (at network layer) : Total data is 1600 bytes

At network 2

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

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

$$= 480 - 20 = 460 \text{ Bytes}$$

As 460 is not divisible by 8. So, add 4 byte in it.

[∵ 460 + 4 = 464/8 = 58]

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

$$n = \frac{1600 \text{ Bytes}}{464 \text{ Bytes}} = 3.44$$

∴ Take it as 4 fragments

1^{st} fragment data → 464 Bytes	20 | 464	1^{st} packet
2^{nd} fragment data → 464 Bytes	20 | 464	2^{nd} packet
3^{rd} fragment data → 464 Bytes	20 | 464	3^{rd} packet
4^{th} fragment data → 208 Bytes	20 | 208	4^{th} packet

Total data size transmitted to destination = 1680 Bytes.

14. (b)

Net outflow from the token bucket is:

= 6 Mbps – 1 Mbps

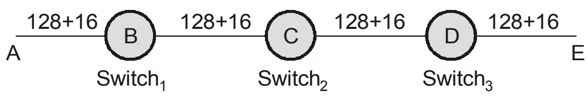
As a result the time it takes for the full bucket of 1 Mb to empty is: 1 Mb/5 Mbps = 0.2 sec

∴ During first 0.2 sec, it transmits with 6 Mbps, then switches to 1 Mbps.

15. (d)

Transmission time of A for putting packet on to the ethernet,

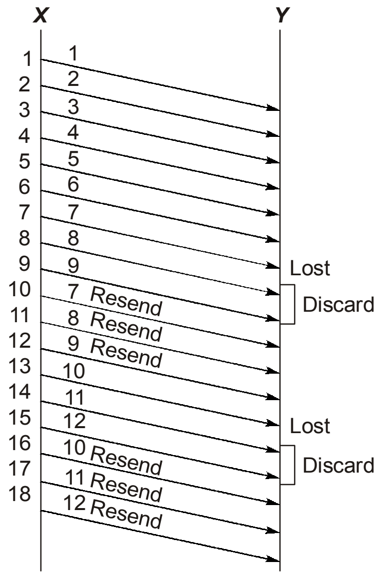
$$\frac{1600 \times 8}{10^8} = 128 \ \mu s$$



The time needed for last bit of packet to propagate to the first switch is 16 μs. The time needed for first switch to transmit the packet to second switch is (128 + 16) μs and the same happens for remaining switches, each segment introduces a 128 μs T_{delay}, 16 μs P_{delay}.

Thus, total latency = (128 + 16) + (128 + 16) + (128 + 16) + (128 + 16) = 576 μs.

16. (b)



17. (b)

The network mask of class C = 255.255.255.0.
To satisfied the need of 510 host we have to borrow 1 bit from network portion i.e. 255.255.254.0.
The DBA of this network is: 255.255.255.254 i.e., 255.255.11111111.11111110.

18. (d)

Efficiency for a sliding window protocol is

$$\eta = \frac{N}{1+2a}$$

where N is the window size.

$\Rightarrow$ $N = 63 - 1 = 62$

Utilization is given as 0.50

$$\therefore \quad 0.50 = \frac{62}{1+2a} \quad \quad \ldots (1)$$

where $a = \frac{t_p}{t_d}$

$$t_d = \frac{x \text{ bytes}}{1 \text{ Mbps}}$$

$$t_p = \frac{2 \times 6000 \times 10^3}{3 \times 10^8} = 0.4 \text{ sec}$$

$$a = 0.4 \text{ Mbps} / x \text{ byte}$$

$$\therefore \quad 1+2(0.4 \text{ Mbps}/x \text{ byte}) = 124 \quad \quad \ldots(1)$$

$$2(0.4 \text{ Mbps}/x \text{ byte}) = 123$$

$$\frac{0.8 \text{ Mbps}}{x \text{ byte}} = 123$$

$$x \approx 81301 \text{ byte}$$

19. (b)

If LSP is with less recent data than the data stored in database is received, then new LSP is updated with database data and is sent back only over the link from which the first LSP was received.

So, option (a) is wrong.

20. (a)

The functionality of network layer is source to destination delivery of packets.

21. (a)

Burst length of computer is given by

$$S = \frac{C}{M - e}$$

C → Bucket capacity, M → Output rate, e → Bucket fill rate

$$S = \frac{15 \times 10^6}{8 \times 10^6 - 4 \times 10^6} = 3.75 \text{ seconds}$$

22. (c)

IP Addr : 154.33.7.220

Mask : 255.255.255.192 {apply BITWISE AND}

10011010 . 00010001 . 00000111 . 11000000

220 : 111 $\underbrace{011100}_{\text{Host bits in IP}}$

Destination address is of class B network. Therefore Network ID is 154.33 and as per mask we can say that 10 bits are used for subnetting and remaining are host bits.

∴ Subnet ID bits are 0000011111 and Host ID bits are 011100

23. (c)

Number of subnets = 2048

Bits required for subnet = 11

Network mask = 255.255.255.224

Number of hosts / subnet = $2^5 - 2$

Ranges are:

164.76.0.0/27 **to** 164.76.0.31/27 ——— 1^{st} subnet

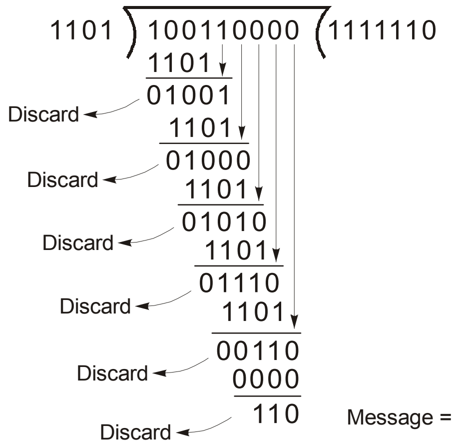
164.76.0.32/27 **to** 164.76.0.63/27 ——— 2^{nd} subnet

164.76.0.64/27 **to** 164.76.0.95/27 ——— 3^{rd} subnet

164.76.255.224/27 **to** 164.76.255.255/27 ——— 64^{th} subnet

24. (c)

- 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



Message = 100110 110

25. (b)

Attempt	Sender's Congestion Window (kB)	Threshold (kB)
0	2	64
1	4	64
2	8	64
3	16	64
4	32	64
5	2	16
6	4	16
7	8	16
8	16	16
9	18	16
10	20	16

During attempt number 9, senders congestion window size = 18

26. (c)

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

$$\frac{\text{Data size}}{\text{B.W.}} = 2 \times \frac{d}{v}$$

Velocity is same when media is same, bandwidth for fast ethernet is 100 Mbps.
In order to maintain the same frame size since bandwidth is increased from 10 to 100 Mbps the distance will be reduced from L to L/10.
Here length of cable is given 98 m.

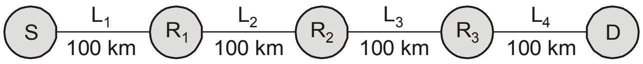
So, length of cable to support frame size 64 byte = $\frac{98}{10} = 9.8$.

27. (a)

$$\text{I.R.T.T} = 30 \text{ ms}$$
$$\text{N.R.T.T} = 26 \text{ ms } (\alpha = 0.9)$$
$$\text{E.R.T.T} = \alpha \times \text{I.R.T.T} + (1-\alpha) \times \text{N.R.T.T} = 0.9 \times 29 + 0.1 \times 26$$
$$\text{E.R.T.T} = 26.1 + 2.6 = 28.7 \text{ ms}$$
$$\text{I.R.T.T} = 28.7 \text{ ms}$$
$$\text{N.R.T.T} = 32 \text{ ms}$$

$$\text{E.R.T.T} = 0.9 \times 28.7 + 0.1 \times 32 = 25.83 + 3.2 = 29.03 \text{ ms}$$
$$\text{I.R.T.T} = 29.03 \text{ ms}$$
$$\text{N.R.T.T} = 24 \text{ ms}$$
$$\text{E.R.T.T} = 0.9 \times 29.03 + 0.1 \times 24 = 26.127 + 2.4 = 28.527 \text{ ms}$$

28. (a)



Propagation delay to travel from S to R_1

$$\frac{\text{Distance}}{\text{Link Speed}} = \frac{10^5}{10^8} = 1\text{ms}$$

Total propagation delay to travel from S to D = 4 ∗ 1 ms = 4 ms

Total transmission delay for 1 packet

$$= 4 * \frac{(\text{Number of bits})}{\text{Bandwidth}}$$

$$= 4 * \frac{(1000)}{10^6} = 4 \text{ ms}$$

So the first packet will take 8 ms to reach D. While first packet was reaching D, other packets must have been processing in parallel. So D will receive remaining packets 1 packet per 1 ms from R_3.

So remaining 999 packets will take 999 ms and total time will be 999 + 8 = 1007 ms.

29. (b)

For pure aloha maximum throughput is 18.4%

For slotted aloha maximum throughput is 36.8%

$$\therefore \quad \text{Pure aloha} = \frac{18.4}{100} \times 90 = 16.56 \text{ Kbps}$$

$$\therefore \quad \text{For slotted Aloha} = \frac{36.8}{100} \times 90 = 33.12 \text{ Kbps}$$

$$\text{Difference} = \text{Slotted aloha} - \text{Pure aloha}$$
$$= 33.12 - 16.56 = 16.56$$

30. (a)

$$\text{Node throughput} = 50 \text{ frames/sec}$$
$$\text{System throughput} = 100 * (\text{node throughput})$$
$$= 100 * 50 = 5000 \text{ frames/sec}$$

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

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

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