Branch : CSE & IT | Batch : Hinglish

Computer Network

Error Control

DPP 01

[MCQ]

1. The Hamming distance between 100 and 001 is _____.

(a) 2 (b) 0

(c) 1 (d) None of the above

[MCQ]

2. Consider the following statements:

S_1: If the change occurs in single-bit position with respect to whole data, then such error is called single bit error.

S_2: If the change occurs in two or more-bit positions with respect to whole data, then such error is called burst error.

(a) Only S_1 is true

(b) Only S_2 is true

(c) Both S_1 and S_2 are true

(d) Neither S_1 nor S_2 is true

[MCQ]

3. Which is/are the error detection techniques?

(a) Check sum (b) VRC

(c) CRC (d) All of the above

[MCQ]

4. We add r redundant bits to each block to make the length n = k + r. The resulting n bit blocks are called _____.

(a) Block words (b) Code words

(c) Data words (d) None of these

[MCQ]

5. In block coding, if k=2 and n=3, we have _____invalid codewords

(a) 8

(b) 4

(c) 2

(d) none of the above

[MCQ]

6. A parity check can detect ____.

(a) 1-bit error (b) 2-bit error

(c) 8-bit error (d) None of these

[MCQ]

7. Assume that data has been transmitted on link using the 2D parity scheme for error detection. each sequence of 32-bits is arranged in a 4×8 matrix (rows r_0 through r_3 and column d_0 through d_1) and is p added with a column do and row r_4 of parity bits computed using the even parity scheme. each bit of column d_0 (respectively, row r_4) gives the parity of the corresponding row (respectively column) these 45 bits are transmitted using data link. assuming the following bits (data) are received on receiver's side.

101100111101010111011110100110000011100000111

Considering that, first bit that is received by receiver is MSB, then which of the following bit has corrupted during the Transmission.

(a) (r_3, D_6)

(b) (r_2 D_6)

(c) (r_1, D_2)

(d) None of the bit is corrupted

[NAT]

8. Assume a binary code that contains only 5 valid code words as given 0000000, 1010110, 0101111, 0101010, 1101001 and assume minimum hamming distance of a code be x and maximum number of erroneous bits that can be deleted by the code is y and corrected by code be z, then the value of x + y + z is _____

[NAT]

9. Considers the following error deletion scheme. every binary codeword (or) message is 2 bit long and for each binary message [d_1, d_0] three parity bits are appended. corresponding code words are [d_1, d_0, P_2, P_1, P_0]. The appended bits are calculated as $P_2 = d_1 + d_0$, $P_1 = d_1$, $P_0 = d_0$ ('+' is a modulo 2 sum) then the minimum hamming distance d_{min} for this error deletion scheme is _____.

[MCQ]

10. In block coding, if n=5, the maximum hamming distance between two codewords is _____.

(a) 2

(b) 3

(c) 5

(d) None of the above

Answer Key

1. **(a)**
2. **(c)**
3. **(d)**
4. **(b)**
5. **(b)**
6. **(a)**
7. **(b)**
8. **(3)**
9. **(3)**
10. **(c)**

Hints & Solutions

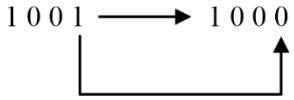
1. (a)

Please refer video solution.

2. (c)

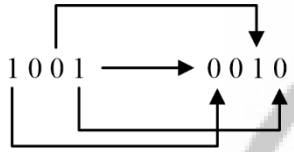
S_1 (True): If the change occurs in single bit position with respect to whole data, then such error is called single bit error

Example:



S_2 (True): If change occurs in two or more-bit positions with respect to whole data then such error is called burst error

Example:



3. (d)

Checksum: This a block code method where a checksum is created based on the data values in the data blocks to be transmitted using some algorithm and append to the data. When the receiver gets this data, a new checksum is calculated and compared with the existing checksum. A non-matching signifies an error.

VRC: It is an error checking method used on an eight-bit ASCII character.

CRC: It is method designed to detect errors in the data and information transmitted over the network.

4. (b)

We add r redundant bits to each data words and resulting word is called as codewords of length $n = k + r$

5. (b)

Please refer video solution.

6. (a)

A Parity check can detect 1 bit error.

Parity check: A parity bit is added to a block of data for error detection purpose. The value of parity bit is assigned either 0 or 1 which makes the number of 1's in the message block either even or odd depending upon the type of parity.

7. (b)

	D_8	D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0
R_0	1	0	1	1	0	0	1	1	1
R_1	1	0	1	0	1	0	1	1	1
R_2	0	1	1	1	1	0	1	0	0
R_3	1	1	0	0	0	0	0	1	1
R_4	1	0	0	0	0	0	1	1	1

Therefore, corrupted bit is (R_2, D_6), hence option b is correct.

8. (3)

The minimum hamming distance here is 2 between 0101111 and 0101010, therefore value of x is 2, to detect 'd' bit errors, hamming distance must be d + 1, therefore number of bits that can be detected is y = 1, to correct d bit error, hamming distance must be 2d +1.

$\therefore$ The number of bits that can be corrected is '0', hence value of x + y + z = 3

9. (3)

Firstly, finding the numbers of codewords

D_1	D_0	P_2	P_1	P_0
0	0	0	0	0
0	1	1	0	1
1	0	1	1	0
1	1	0	1	1

Now finding d_{min}, to find d_{min} we perform X – OR operations on all the code word and select the minimum numbers of 1 that will give us minimum distance.

0 0 0 0 0
0 1 1 0 1
0 1 1 0 1

Number of 1's is 3

0 0 0 0 0
1 0 1 1 0
1 0 1 1 0

Number of 1's is 3

0 0 0 0 0
1 1 0 1 1
1 1 0 1 1

Number of 1's is 4.

0 1 1 0 1
1 0 1 1 0
1 1 0 1 1

Number of 1's is 4

0 1 1 0 1
1 1 0 1 1
1 0 1 1 0

Number of 1's is 3

1 0 1 1 0
1 1 0 1 1
0 1 1 0 1

Number of 1's is 3

∴ The minimum distance (d_{min}) is 3

10. (c)

Please refer video solution.

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Computer Network

Error Control

DPP 02

[MCQ]

1. The message 1011010110 is to be transmitted using to CRC polynomial $x^3 + x^2 + 1$ to protect it from errors. The code ward that should be transmitted will be.

(a) 1011010110000 (b) 1011010110011

(c) 1011010110100 (d) 1011010110111

[MSQ]

2. Which of the following is not false regarding cyclic redundancy check (CRC)?

(a) CRC is an error correction method.

(b) CRC is an error detection method.

(c) CRC is an error correction & detection method.

(d) CRC is based on binary division.

[MCQ]

3. Given generator function G(x) and the message function m(x) as follows.

$G(x) = x^4 + x + 1$

$M(x) = x^9 + x^8 + x^6 + x^4 + x^3 + x + 1$

What will be transmitted function among the following options.

(a) $x^{13} + x^{12} + x^{11} + x^8 + x^7 + x^6 + x^5 + x^3 + x^2 + 1$

(b) $x^{13} + x^{12} + x^{10} + x^8 + x^7 + x^5 + x^4 + x^3 + x^2 + x$

(c) $x^{13} + x^{12} + x^{11} + x^8 + x^7 + x^6 + x^5 + x^3 + x^2 + x$

(d) $x^{13} + x^{12} + x^{11} + x^{10} + x^7 + x^6 + x^5 + x^3 + x^2 + 1$

[MCQ]

4. A d(x) is $x^7 + x^5 + x^4 + x^2 + 1$ transmitted using CRC polynomial method. The g(x) is $x^3 + 1$. What is the polynomial of CRC remainder?

(a) $x + x^0$ (b) x^0

(c) $x2 + x^0$ (d) $x2 + x + x^0$

[NAT]

5. For the given bits 10101011 and generator polynomial $x^3 + 1$ calculate the CRC remainder.

Note: If you are getting 1101 as the answer write it in the decimal. (for example $(1101)_2 = 13$).

Answer Key

1. **(d)**
2. **(b, d)**
3. **(b)**
4. **(b)**
5. **(4 to 4)**

Hints & Solutions

1. (d)

Given message = 1011010110

$g(x) = x^3 + x^2 + 1$

$\Rightarrow 1 \times x^3 + 1 \times x^2 + 0 \times x^1 + 1 \times x^0$

$\Rightarrow$ 1101

1101) 1011010110000(110010011
1101
×1100
1101
×0011
0000
×0110
0000
×1101
1101
×0001
0000
×0010
0000
×0100
0000
×1000
1101
×1010
1101
×111

Code word: 1011010110111

2. (b, d)

The CRC is used to detect the errors in the data and information transmitted over the network. This is performing a binary solution on the transmitted data at the sender's side and verifying the same at the receiver's side.

3. (b)

$G(x) = x^4 + x + 1$

$\Rightarrow 1 \times x^4 + 0 \times x^3 + 0 \times x^2 + 1 \times x^1 + 1 \times x^0$

$\Rightarrow$ 10011

$M(x) = x^9 + x^8 + x^6 + x^4 + x^3 + x + 1$

$\Rightarrow 1 \times x^9 + 1 \times x^8 + 0 \times x^7 + 1 \times x^6 + 0 \times x^5 + 1 \times x^4 + 1 \times x^3 + 0 \times x^2 + 1 \times x^1 + 1 \times x^0$

$\Rightarrow$ 1101011011

10011) 11010110110000(1100001010
10011
×10011
10011
× 00001
00000
×00010
00000
×00101
00000
×01011
00000
×10110
10011
×01010
00000
×10100
10011
×01110
00000
×1110

Code word: 11010110111110

Transmitted function: $x^{13} + x^{12} + x^7 + x^5 + x^3 + x^2 + x^1$

4. (b)

$d(x) = x^7 + x^5 + x^4 + x^2 + 1$

$\Rightarrow 1 \times x^7 + 0 \times x^6 + 1 \times x^5 + 1 \times x^4 + 0 \times x^3 + 1 \times x^2 + 0 \times x^1 + 1 \times x^0$

$\Rightarrow$ 10110101

$g(x) = x^3 + 1$

$\Rightarrow 1 \times x^3 + 0 \times x^2 + 0 \times x^1 + 1 \times x^0$

$\Rightarrow$ 1001

1001) 10110101000(10100001
1001
×0100
0000
×1001
1001
×0000
0000
×0001
0000
×1010
0000
×0100
0000
×1000
1001
×001 $\Rightarrow$ 001 $\Rightarrow x^0$

5. (4 to 4)

$g(x) = x^3 + 1$

$\Rightarrow 1 \times x^3 + 0 \times x^2 + 0 \times x^1 + 1 \times x^0$

$\Rightarrow 1001$

1001) 10101011000(10111100

1001

×0111

0000

×1110

1001

×1111

1001

×1101

1001

×1000

1001

×0010

0000

×0100

0000

100

CRC remainder = 100

Hence $(100)_2 = (4)_{10}$

Any issue with DPP, please report by clicking here:- https://forms.gle/t2SzQVvQcs638c4r5

For more questions, kindly visit the library section: Link for web: https://smart.link/sdfez8ejd80if

PW Mobile APP: https://smart.link/7wwosivoicgd4

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Computer Network

Flow Control

DPP 01

[MCQ]

1. Which of the following is/are the true statement (s) about the type of acknowledgement in stop & wait protocol?

(a) It supports cumulative acknowledgement
(b) It supports Individual acknowledgement
(c) It supports cumulative as well as individual acknowledgement
(d) None of the above

[MCQ]

2. If the bandwidth of the line is 100 mbps, RTT is 50 usec and frame size is 50 bits the find out the link utilization in stop & wait.

(a) 2% (b) 4%
(c) 10% (d) 1%

[NAT]

3. In stop & wait protocol, sender wants to transmit 15 data packets to the receiver. Out of these 15 packets, every 5^{th} data packet is last calculate the total number of packets sent by sender.

[NAT]

4. A stop & wait ARQ protocol in used by the sender to send frames in a dependable manner. The frames are transmitted at 100 kbps rate and have a 1000 byte size. The size of acknowledgement is 10 bytes and receiver receives it at 10 kbps transmission rate. The propagation delay in one direction is 50 m sec. delay in one direction is 50 m sec. calculate the sender throughput in bytes/sec (to the closet integer) Assume that number frame is being lost.

[MCQ]

5. Assume that in stop and wait protocol the probability of frame being lost is N then what will be mean number of transmission of a frame?

(a) $\frac{1}{N}$ (b) $\frac{1}{1-N}$
(c) $\frac{1}{N-1}$ (d) N

[MCQ]

6. Stop and wait protocol is used for transmitting data between two devices over a communication channel. It is a simple protocol consider the following statements about stop and wait protocol.

S1 : Stop and wait protocol offers the flow control.
S2 : Sender and receiver window size is 1.
S3 : Sender and receiver window size is N.
S4 : Stop and wait protocol is half duplex.

Which of the following statement (s) is/are true?

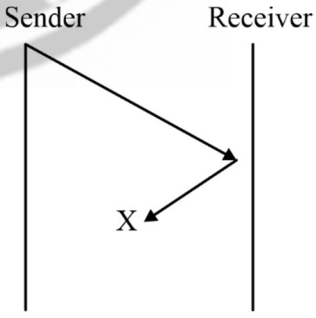
(a) S1, S3 (b) S1, S2, S3, S4
(c) S1, S2 S4 (d) S2, S3, S4

[NAT]

7. The bit rate of a channel is 8 kbps, and one-way propagation delay is 40 msec. The protocol used for the channel is stop and wait. The acknowledgement frame transmission time is negligible. The minimum frame size needed to achieve channel efficiency of at least 50% is _____bytes.

[MCQ]

8. Consider the following diagram:



Among the problems is stop and wait protocol. Which of the following problems represented by the give diagram.

(a) Lost data
(b) Lost acknowledgement
(c) Delayed acknowledgement
(d) Delayed data

Answer Key

1. **(b)**
2. **(d)**
3. **(18)**
4. **(1101)**
5. **(b)**
6. **(c)**
7. **(80)**
8. **(b)**

Hints & Solutions

1. (b)

Stop & wait supports only individual acknowledgement

2. (d)

Bandwidth = 100 mbps
RTT = 50 μsec.
Frame size = 50 bits
Bandwidth = 100 mbps
$\because$ In 1 sec. $\rightarrow 10^8$ bits
$\therefore$ 50 μsec $\rightarrow 50\times10^{-6} \times 10^8$ bits
Number of bits in 1 RTT = 5000 bits

$$\text{Number of frames in 1RTT} = \frac{5000}{50} = 100$$

$$\text{Link utilization in stop \& wait} = \frac{1}{100}\times 100 = 1\%$$

3. (18)

The packets will be sent as-

1 2 3 4 [5] 5 6 7 8 [9] 9 10
Lost Lost

11 12 [13] 13 14 15
Lost

The lost packets are – 5, 9 and 13
The total number of packets those will be by sent the sender are = 15 + 3 = 18

4. (1101)

Given:
Transmission rate at sender side = 10 kbps
Frame size = 1000 bytes
Ack size = 10 bytes
Transmission rate at receiver side = 10 kbps
Ony-way propagation delay = 50 msec.

$$\text{Transmission time } (t_{frame}) = \frac{1000 \text{ bytes}}{10\times10^3 \text{ bits/sec.}} = \frac{1000 \times 8 \text{ bits}}{10\times10^3 \text{ bits/sec.}} = 800 \text{ msec.}$$

$$\text{Transmission time}(t_{ack}) = \frac{10 \text{ bytes}}{10 \text{ k bits /sec}} = \frac{10\times8 \text{ bits}}{10\times10^3 \text{ bits /sec}} = 8\times10^{-3} \text{ sec.} = 8 \text{ msec.}$$

Total cycle time $= t_{frame} + t_{ack} + 2\times$ Propagation time
$= 800 + 8 + 2 \times 50$
$= 808 + 100$
$= 908$ msec.

$$\text{Sender throughput} = \frac{\text{Frame size}}{\text{Totol cycle time}} = \frac{1000 \text{ bytes}}{908 \text{ msec.}}$$
$= 1.10132\times10^3$ bytes/sec.
$= 1101.32$ bytes/sec.

5. (b)

The mean number of transmissions of a frame will be $\frac{1}{1-N}$ if the probability of frame being lost is N.

6. (c)

Stop and wait protocol offers the flow control and the sender and receiver window size is 1 stop and wait protocol is half duplex.

7. (80)

Given
Bandwidth = 8Kbps
Propagation delay (tp) = 40 msec.
Efficiency $\geq$ 50%

$$\text{Efficiency} \geq \frac{1}{2}$$

$$\frac{t_{frame}}{t_{frame} + 2\times tp} \geq \frac{1}{2} \left(t_{frame} = \text{transmission time of frame}\right)$$

$$\frac{1}{1 + 2\times\frac{tp}{t_{frame}}} \geq \frac{1}{2}$$

$$2 \geq 1 + 2\times\frac{tp}{t_{frame}}$$

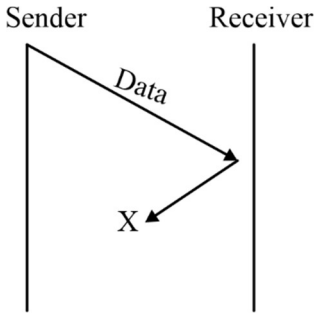
$$\frac{2\times tp}{t_{frame}} \leq 1$$

$$t_{frame} \geq 2\times tp$$

$$\frac{L \text{ bits}}{\text{Bandwidth}} \geq 2\times tp$$

L bits $\geq 2 \times tp \times$ bandwidth
$\geq 2 \times 40 \times 10^{-3}$ sec. $\times 8 \times 10^3$ bits /sec.
L $\geq 2 \times 40 \times 8$ bits
L ≥ 80 bytes

8. (b)



Sender is waiting for acknowledgement that is being lost. Sender will keep on waiting for the acknowledgement.

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Computer Network

Flow Control

DPP 02

[NAT]

1. A satellite has a propagation delay of 800ms and the bandwidth of the satellite is 40 Kbps. The transmission uses the "Go Back N- ARQ" protocol with N has a value of 10. If the size of each frame is 100 bytes then what is the maximum data rate possible in Kbps.

[MCQ]

2. If the maximum sequence number in Go-Back-N-ARQ is 'S' that what will be the receiver window size?

(a) $\frac{S+1}{2}$ (b) $S + 1$

(c) S (d) 1

[MSQ]

3. Which of the following statement(s) is/are correct about Go-Back-N-ARQ?

(a) In Go-Back-N-ARQ if the maximum sequence number is K then sender window size will be K.

(b) Go-Back-N-ARQ uses cumulative acknowledgment.

(c) In Go-Back-N-ARQ time out timer is maintained only for the first frame of the window.

(d) None of the above

[NAT]

4. If the maximum sender window size in Go-Back-N-ARQ is 15 then what will be the number of sequence bit?

[MSQ]

5. In Go-Back-N protocol if the maximum window size is 16. Then what will be the range of sequence number.

Note: If the range is from a to b then write the answer in the from the $\frac{a+b}{2}$.

(a) 16 (b) 4

(c) 8 (d) None of these

Answer Key

1. **(Range 4.92 to 4.94)**
2. **(d)**
3. **(a,b,c)**
4. **(4)**
5. **(c)**

Hints & Solutions

1. (Range 4.92 to 4.94)

Tp = 800 msec.
Bandwidth = 40 Kbps
Frame size = 100 bytes
N = 10

$$T_{t(frame)} = \frac{\text{framesize}}{\text{Bandwidth}} = \frac{100\times 8 \text{ bits}}{40\times 10^3 \text{ bits/sec.}}$$
$$= 20\times 10^{-3} \text{ sec.}$$
$$= 20 \text{ msec.}$$

$$\text{Maximum data rate} = \frac{N \times \text{frame size}}{T_t + 2\times T_p}$$
$$= \frac{10\times 100\times 8 \text{ bits}}{(20 + 2\times 800)\text{m sec.}}$$
$$= \frac{8000}{1620}\text{Kbps} = 4.938 \text{ Kbps}$$

2. (d)

In Go-Back-N-ARQ if the maximum sequence number is S then

Sender window size = S

Receiver window size = 1 (always)

3. (a,b,c)

All the given statement are true about Go-Back-N-ARQ.

4. (4)

$S.W.S \le 2^m$
$S.W.S = 2^m - 1$
$15 = 2^m - 1$
$2^m = 15 + 1$
$2^m = 16$
$2^m = 2^4$
$\boxed{m = 4}$

5. (c)

Maximum window size = 16
Then range of sequence number will be
0 – 16
a = 0 b =16

$$\Rightarrow \frac{a+b}{2} = \frac{0+16}{2} = 8$$

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Computer Network

IPv4 Addressing

DPP 01

[NAT]

1. Let 2^p and 2^q be the number of networks present in class B and class C under IPv4 addressing format, the value of p + q is _____.

[MSQ]

2. Which of the following is/are VALID IP addresses belonging to class C under IPV4 addressing format?

(a) 191. 82. 129. 75

(b) 208. 21. 97. 120

(c) 224. 82. 31. 128

(d) 223. 32. 64. 124

[MCQ]

3. Consider a hypothetical IPv4 address of 36 bits where class A contain 2^{35} IP addresses. Then the number of IP address present in class D will be : (Assume classful address is used).

(a) 2^{28}

(b) 2^{32}

(c) 2^{34}

(d) None of these

[MCQ]

4. Which of the following is/are correct?

(a) Class A IPv4 address start form 0.0.0.0.

(b) Class B IPv4 address start from 127.0.0.0.

(c) Class C IPv4 address start from 191.0.0.0.

(d) None of the above.

[MCQ]

5. Consider the following statements-

I: The ratio of the number of IP addresses contained in class A to that of class E is 8:1.

II: The number of IP addresses contained in class D is 75% less than the number of IP addresses contained in class B.

Which of the above given statement(s) is/are INCORRECT?

(a) I only (b) II only

(c) Both I and II (d) Neither I nor II

[MCQ]

6. If the number of networks present in class B are 2^m, then number of hosts present in class C are : (classful addressing scheme is followed)

(a) $2^m - 2$

(b) $2^{m+2} - 2$

(c) $\sqrt{2^{m+2}} - 2$

(d) 2^m

[MSQ]

7. If number of network present in class B and class C are 2^p and 2^q respectively. And number of hosts present in B and class C are $(2^m–2)$ and $(2^n–2)$ respectively. Then which of the following is/are correct?

(a) Relation between p and q will be 2q = 3p.

(b) The number of networks present in class A $2^{n-1} – 2$ possible.

(c) Relation between m and n will be m = 2n.

(d) Relation between p and n will be 4p = 7n.

[MCQ]

8. Which of the following IP address cannot be assigned to any host?

(a) 127.10.15.243 (b) 129.46.255.255

(c) Both (a) and (b) (d) None of the above.

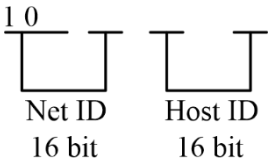
Answer Key

1. **(35)**
2. **(b, d)**
3. **(b)**
4. **(d)**
5. **(d)**
6. **(c)**
7. **(a, b, c, d)**
8. **(c)**

Hints & Solutions

1. (35)

Class B

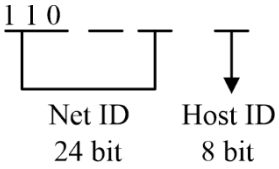


Number of networks

$= 2^{16-2} = 2^{14}$

p = 14

Class C



Number of networks

$= 2^{5+8+8} = 2^{21}$

q = 21

$\therefore$ p + q = 14 + 21 = 35

2. (b, d)

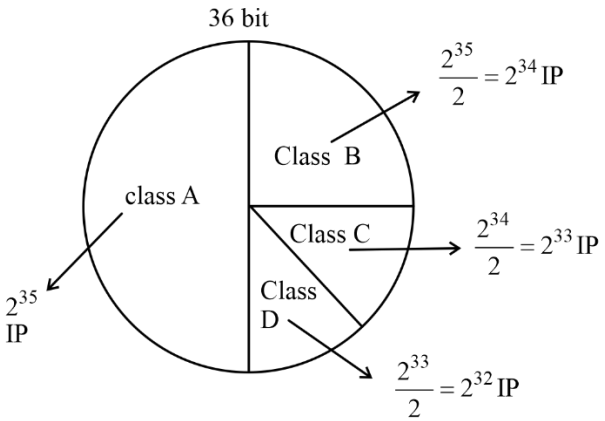
IP addresses belonging to class C are in the range 192·X·X·X – 233·X·X·X

$\therefore$ (b, d) are valid class C IP addresses

3. (b)

IPv4 address = 36 bit

Hypothetically given but practically not possible



4. (d)

- Range of class A is (1 – 126) because 0.0.0.0 is non routable IPv4 address it's used for default router **(FALSE)**
- Class B range is (128 to 191) 128.0.0.0 to 191.255.255.255 **(FALSE)**
- Class C IPv4 address range (192 to 223). So, 191.0.0.0 is of class B IPv4 address but not of class C. **(FALSE)**

5. (d)

	Number of IP addresses
Class A	2^{31}
Class B	2^{30}
Class C	2^{29}
Class D	2^{28}
Class E	2^{28}

Class A: Class E = $2^{31} : 2^{28} = 2^3 : 1 = 8 : 1$

(I) is correct

$$\frac{\text{Class B} - \text{Class D}}{\text{Class B}}$$

$$= \frac{2^{30} - 2^{28}}{2^{30}}$$

$$= \frac{2^{28}\left(2^2 - 1\right)}{2^{30}}$$

$$= \frac{3}{4}$$

= 75%

(II) is correct

6. (c)

- The number of networks in class B = 2^{14}
- The number of hosts in class C = $2^8 - 2$

$2^m = 2^{14}$

m = 14

(a) $2^m - 2 = 2^{14} - 2 \neq 2^8 - 2$ **(False)**

(b) $2^{m+2} - 2 = 2^{14+2} - 2 = 2^{16} - 2 \neq 2^8 - 2$ **(False)**

(c) $\sqrt{2^{m+2}} - 2 = \sqrt{2^{14+2}} - 2$

$= \sqrt{2^{16}} - 2$

$= 2^8 - 2$ **(True)**

Hence, option (c) is correct.

7. (a, b, c, d)

Given:

Number of Networks in class B = $2^p = 2^{14}$

Number of Networks in class C = $2^q = 2^{21}$

Number of Hosts in class B = $2^m - 2 = 2^{16} - 2$

Number of Hosts in class A = $2^n - 2 = 2^8 - 2$

- p = 14
- q = 21
- m = 16
- n = 8

(a) $\frac{p}{q} = \frac{14}{21}$

$\boxed{3p = 2q}$ **(True)**

(b) Class A networks = 126

$2^{n-1} - 2 = 2^{8-1} - 2$

$= 2^7 - 2$

$= 128 - 2$

$= 126$ **(True)**

(c) $\frac{m}{n} = \frac{16}{8}$

$\boxed{m = 2n}$ **(True)**

(d) $\frac{p}{n} = \frac{14}{8}$

$\boxed{4p = 7n}$ **(True)**

8. (c)

(a) 127.10.15.243 is reserved for loop back or self-connectivity testing.

(b) 129.46.255.255 it's a class B IP address.

10000000.00101110 . 11111111.11111111

NID HID

If all 1's present in HID part. This IP address cannot be assigned to any host (Reserved for special purpose). This IP address is used for DBA of the respective network.

Hence, option (c) is correct.

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Computer Network

IPv4 Addressing

DPP 02

[MSQ]

1. Which of the following is/are correct?

(a) In unicast communication transmitting a packet from one computer to another computer in different class is possible.

(b) In unicast communication transmitting a packet from one computer to another computer in same class is possible.

(c) Transmitting a packet from one computer to all computer is called multicast communication.

(d) Transmitting a packet from one computer to many computer is called broadcast communication.

[MCQ]

2. Which of the following is true?

(a) Network ID is same for each class in IP address.

(b) Direct broadcast address (DBA) is same for each class.

(c) Limited broadcast address (LBA) is same for class A, B and C.

(d) Limited broadcast address (LBA) for class D is 255.255.255.255.

[NAT]

3. Consider a host with IP address 192.11.0.248, how many network ID bits are allocated for given IP? ____.

[NAT]

4. Consider the following statements:

S_1: ARP request is always broadcast with in the network.

S_2: ARP reply is unicasting.

S_3: MAC address is of 6 bytes.

S_4: With the help of port number process can be found within the host.

Total number of INCORRECT statements is/are _____.

[MCQ]

5. Consider a host with IP address 190.11.25.0 which of the following will be a valid network ID?

(a) 190.11.255.255

(b) 190.0.0.0

(c) 190.11.0.0

(d) None of these

[MCQ]

6. Consider the IP address 224.224.92.69 which of following will be direct broadcast address for the given host IP?

(a) 224.224.92.255

(b) 224.244.255.225

(c) 255.255.255.255

(d) None of these

[MSQ]

7. Consider an IP address 167.0.64.68. Which of the following option is/are correct for given IP address?

(a) Limited broadcast address for the given IP address is 255.255.255.255.

(b) Direct broadcast address for given IP address is 167.255.255.255.

(c) Network ID for given IP address is 167.0.0.0.

(d) Limited broadcast address for given IP is same as direct broadcast address.

[MCQ]

8. The correct dotted decimal notation format for given hexadecimal notation (HDN) 162184AF is

(a) 175.132.33.22

(b) 22.33.132.174

(c) 22.33.132.175

(d) None of these

Answer Key

1. **(a, b)**
2. **(c)**
3. **(24)**
4. **(0)**
5. **(c)**
6. **(d)**
7. **(a, c)**
8. **(c)**

Hints & Solutions

1. (a, b)

- Transmitting a packet from one computer to another computer with in the same class or in the different class is known as unicast communication.
- Transmitting a packet from one to many (0 or more) is known as multicast communication.
- Transmitting a packet from one to all computer is known as broadcast communication.

2. (c)

- Limited broadcast address (LBA) is same for class A, B and C i.e 255.255.255.255.
- There is no LBA and DBA in class D and E.

3. (24)

IP = 192.11.0.248

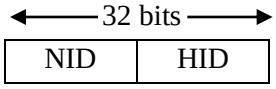
= 11000000.00001011.00000000.11111000

↓

First three bits are 110. It's class C IP address

Class C IP range = 192 – 223

Class C



Total NID bits = 24

Hence, (24) is correct.

4. (0)

- ARP request is broadcasting.
- ARP reply is unicasting.
- Size of MAC address is 48 bits or 6 bytes.
- Identification of process with in the host is port number.

5. (c)

IP address: 190.11.25.0 (Class B)

Network mask: 255.255.0.0

- IP address
  AND
  Network mask
  Network ID

- 190.11.25.0
  AND
  255.255.0.0

  = 10111110.00001011.00011001.00000000
  11111111.11111111.00000000.00000000
  10111110.00001011.00000000.00000000

NID = 190.11.0.0

Hence, option (c) is correct.

6. (d)

IP = 224.224.92.69

- Class D range 224 to 240. So, it belongs to class D IP address.
- For class D there is no NID, HID, DBA and LBA because class D IP address is used for multicasting.

7. (a, c)

IP address = 167.0.64.68

167.0.64.68
Network ID = AND
255.255.0.0
167.0.0.0

DBA = 167.0.255.255

LBA = 255.255.255.255

Hence, option (a, c) are correct.

8. (c)

HDN = 162184AF

1	6	2	1	8	4	A	F
0001	0110	0010	0001	1000	0100	1010	1111

= 00010110.00100001.10000100.10101111

= 22.33.132.175

Hence, option (c) is correct.

Any issue with DPP, please report by clicking here:- https://forms.gle/t2SzQVvQcs638c4r5

For more questions, kindly visit the library section: Link for web: https://smart.link/sdfez8ejd80if

PW Mobile APP: https://smart.link/7wwosivoicgd4

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Computer Network

IPv4 Addressing

DPP 03

[NAT]

1. After subnetting how many steps are needed to communicate with process?_____

[MCQ]

2. Consider the following statements:

S_1: Subnetting was devised to divide a large block (Network) into smaller ones.

S_2: Subnetting was devised to combine several class C blocks into a large block.

Which of the following is/are correct?

(a) S_1 only (b) S_2 only

(c) Both S_1 and S_2 (d) None of these

[MCQ]

3. Consider the following statements:

S_1: In Subnetting subnet bits are borrowed from host ID part.

S_2: In Subnetting subnet bits are borrowed either from HID part or from NID part.

S_3: Subnetting provides security to one network from another network.

Which of the following is/are correct?

(a) S_1 and S_2 (b) S_1 and S_3

(c) S_2 and S_3 (d) All are correct

[MSQ]

4. Which of the following is/are correct statement?

(a) First subnet ID and entire network ID is always same.

(b) Last subnet ID and entire network ID is always same.

(c) DBA of the first subnet and DBA of entire network is always same.

(d) DBA of the last subnet and DBA of entire network is always same.

[MSQ]

5. Consider a subnet mask 255. 255.255.192, the number of subnets is/are possible:

(a) 2^{18} (b) $2^{18}-2$

(c) 2^2 (d) 2^7-2

Answer Key

1. **(4)**
2. **(a)**
3. **(b)**
4. **(a, d)**
5. **(a, c)**

Hints & Solutions

1. (4)

Subnetting complicates the communication process. Instead of the 3step procedure now it becomes 4 step procedure.

(1) Identify the network.
(2) Identify the subnet with in the network.
(3) Identify the host with in the subnet.
(4) Identify the process with in the host.

2. (a)

The process of divide a big network into many smaller subnets is called as subnetting.
Hence, option (a) corrects.

3. (b)

- In subnetting subnet bits are borrowed from HID part only.
- Subnetting provides security to one network from another network.

Hence, option (b) is correct.

4. (a, d)

- First subnet ID and entire network ID is same.
- DBA of the last subnet and DBA of entire network is same.

Hence, (a, d) are correct.

5. (a, c)

Subnet mask = 225.225.255.192
Subnet mask = 11111111. 11111111. 11111111. 11000000
Number of 1's = 26

- If given subnet mask is of class A then,
- Number of subnet bits = 26 – 8 = 18
- Number of subnets = 2^{18}
- If given subnet mask is of class B then,
- Number of subnet bits = 26 – 16 = 10 bits
- Number of subnets = 2^{10}
- If given subnet mask is of class C then,
- Number of bits = 26 – 24 = 2
- Number of subnet = $2^2 = 4$

Number of subnets = 2^2, 2^{10} and 2^{18} are possible.
Hence, option (a, c) are correct.

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Computer Network
IPv4 Addressing

DPP 04

[NAT]

1. Suppose, a class B network with subnet mask 255.255.224.0 the number of hosts per subnet is ___.

[MCQ]

2. An organization has class B network and wishes to form subnet for 65 departments. The subnet mask would be?

(a) 255.255.0.0 (b) 255.255.254.0

(c) 255.255.194.0 (d) 255.255.252.0

[NAT]

3. In a class B network on the internet has a subnet mask 255.255.252.0. What is the minimum number of hosts per subnet is/are possible. So, that subnet mask fails? _____.

[NAT]

4. Suppose, network ID of entire network is 176.178.0.0 and subnet mask is 255.255.255.0. If X is the number of bits borrowed from HID and Y is the total number of subnets in network then the value of $\frac{Y}{X}$ is ____.

[NAT]

5. Suppose a network ID of network is 160.160.0.0 and subnet mask is 255.255.254.0. The total bits are borrowed from HID part is/are _____.

[MCQ]

6. If a class B network on the internet has subnet mask of 255.255.252.0. What is the maximum number of hosts/subnets? (Assume classful addressing scheme is followed)?

(a) 1022 (b) 2046

(c) 1023 (d) 2047

[MCQ]

7. Consider a class C network 15 subnets and 25 hosts per subnet. An appropriate subnet mask for this network would be?

(a) 255.255.240.0 (b) 255.255.255.254

(c) 255.255.255.240 (d) None of these

Answer Key

1. **(8190)**
2. **(b)**
3. **(1023)**
4. **(32)**
5. **(7)**
6. **(a)**
7. **(d)**

Hints & Solutions

1. (8190)

Class B = | NID (16 bits) | HID (16 bits) |

Subnet mask = 255.255.224.0

= 11111111.11111111.11100000.00000000

Number of subnet bits = number of 1's in subnet mask – NID bits

= 21 – 16

= 5

Number of host bit = Number of 0's in subnet mask

= 13

Number of hosts = $2^{13} - 2$

= 8 * 1024 – 2

= 8192 – 2

= 8190

2. (b)

Class = B

NID = 16 bits

HID = 16 bits

- To divide 65 departments, we have to borrow 7 bits from HID
- | NID | SID | HID |
  | 16 | 7 | 9 |

Number of 1's in subnet mask = 16 + 7 = 23

Subnet mask

= 11111111.11111111.11111110.00000000

= 255.255.254.0

3. (1023)

Subnet mask = 255.255.252.0

= 11111111.11111111.11111100.00000000

HID bits = 10

Maximum hosts/subnets = $2^{10} - 2 = 1022$

- With 1022 hosts per subnet, subnet mask will not be fail.
- When hosts/subnet are 1023 subnet mask would be fail because to connect 1023 hots/subnet, HID bit must be 11. But in given subnet mask HID bits are 10.

Hence, (1023) is correct.

4. (32)

Network 1D = 176.178.0.0 (class B)

Subnet mask = 255.255.255.0

= 11111111.11111111.11111111.00000000

NID bits = 16 bits

SID bits = 8 bits

HID bits = 8 bits

X = 8 bit

$Y = 2^8$

= 256

$\frac{Y}{X} = \frac{256}{8}$

= 32

Hence, (32) is correct

5. (7)

NID = 160.160.0.0 (Class B)

SM = 255.255.254.0

= 11111111.11111111.11111110.00000000

Number of bits for SID = 23 – 16 = 7

6. (a)

Subnet mask = 255.255.252.0

= 11111111.11111111.11111000.00000000

NID bits = 16

SID bits = 6

HID bits = 10

Number of hosts/subnets = 2^{10}

$= 2^{10} - 2$

= 1024 – 2

= 1022

Hence, option (a) is correct.

7. (d)

Class = C

Number of bits in NID = 24

Number of bits in HID = 8

Maximum number of hosts = $2^8 - 2$

= 254 possible

Total host given = $15 * 25$

$= 375$

$375 \nleq 254$

It means, if we divide this network into 15 subnets then maximum hosts cannot be 25.

Hence, option (d) is correct.

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Computer Network

IPv4 Addressing

DPP 05

[MCQ]

1. Consider a class C network with 19 subnets and 6 hosts per subnet. Then which of the following is possible subnet mask?

(a) 255.255.255.241

(b) 255.255.255.244

(c) Both (a) and (b)

(d) None of these

[MSQ]

2. An organization need Class B network with 32 subnet and each subnet need 100 hosts which of the following is/are possible subnet mask?

(a) 255.255.7.3

(b) 255.255.128.135

(c) 255.255.248.0

(d) 255.255.0.248

[NAT]

3. A physics wallah organization is granted a class B network with IP address 186.24.0.0. For revolution 2.0, 10 bits are fixed for subnet. Then, the total number of hosts in each subnet are _____.

[MCQ]

4. Consider a class C network 200.200.250.68. if 3 bits are borrowed from HID part, instead of first 3 subnet bits, last 3 bits are borrowed from HID part. Then which of the following is belong to 3rd subnet ID?

(a) 200.200.250.96

(b) 200.200.250.64

(c) 200.200.250.3

(d) 200.200.250.2

[MCQ]

5. Consider a class C network address of 220.220.220.0. it is divided into 3 subnets A, B and C each subnet need 90, 40 and 33 hosts respectively. Which of the following is a valid subnet mask for subnet B and C respectively?

(a) 255.255.255.128 and 255.255.255.192.

(b) 255.255.255.192 and 255.255.255.128.

(c) Both the subnet mask are same.

(d) None of these.

[MCQ]

6. Suppose, a class C network is divided into 3 subnets P, Q and R. Subnet P need 50 host, subnet Q need 40 hosts and subnet R need 120 hosts. Which of the following is an appropriate subnet mask for R?
(Hints: using VLSM technique)

(a) 255.255.255.128

(b) 255.255.255.224

(c) 255.255.255.0

(d) 255.255.255.192

[MCQ]

7. Suppose, an organization is divided into 6 departments with network 199.198.197.196 For each department 3 bits are borrowed from HID part of given network.

SID	Department Number
010	1
100	2
110	3
101	4
111	5
101	6

Which of the following is direct broadcast address of department number 5 and 4 respectively?

(a) 199.198.197.191 and 199.198.197.255

(b) 199.198.197.169 and 199.198.197.191

(c) 199.198.197.169 and 199.198.197.255

(d) 199.198.197.255 and 199.198.197.191

[MCQ]

8. In a class B network. On the internet has a subnet mask 255.255.240.0 How many minimum number of subnets are possible?

(a) 32 (b) 30
(c) 16 (d) 14

Answer Key

1. (c)
2. (a, b, c, d)
3. (62)
4. (d)
5. (c)
6. (a)
7. (d)
8. (c)

Hints & Solutions

1. (c)

- Class = C
- The number of host ID bits = 8 (class C)
- $19 * 6 \leq 2^8 - 2$

  $114 \leq 254$ (Condition True)

  The number of 1's in SM = NID + SID (19 subnet)

  = 24 + 5

  = 29 bits

(a) 11111111.11111111.11111111.11110001

The number of 1's = 29

SM = 255.255.255.241 (Valid)

This subnet mask practically not possible.

(b) 11111111.11111111.11111111.11110100

255 . 255 . 255 . 244

So, both subnet mask are possible.

Hence option (c) is correct.

2. (a, b, c, d)

Class = B (16 NID)

The number of subnets = 32 (5 bit)

The number of 1's in subnet mask = 21

$32 * 100 \leq 2^{16} - 2$ (Host)

$3200 \leq 2^{16} - 2$ (True)

(a) 11111111.11111111.00000111.00000011

255.255.7.3 (possible)

(b) 11111111.11111111.10000000.10000111

255.255.128.135 (possible)

(c) 11111111.11111111.11111000.00000000

255.255.248.0 (best subnet mask)

(d) 11111111.11111111.00000000.11111000

255.255.0.248 (possible)

Hence, all subnet masks are possible.

3. (62)

Class = B (16 bits NID)

Subnet bits = 10

Total number of hosts in class B = $2^{16} - 2$

Total number of host bit after subnet = 32 – 16 – 10

= 6 bits

The number of hosts / subnets = $2^6 - 2$

= 62

Hence, (62) is correct.

4. (d)

Network = 200.200.250.68

HID bit = 8 bit (class C)

Subnet bits	Subnet number
4 2 1	
0 1 0	3rd subnet

Last 8 bits = 00000010

↓

Subnet bits

= 2

3rd subnet ID = 200.200.250.2

Hence, option (d) is correct.

5. (c)

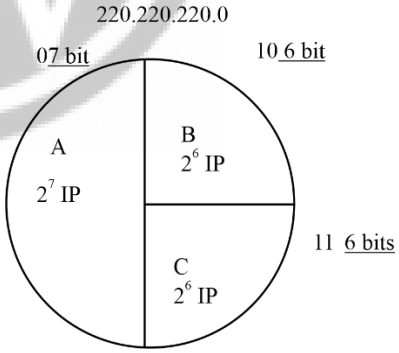
Class = C

Subnet A = 90 (7 bits)

Subnet B = 40 (6 bits)

Subnet C = 33 (6 bits)

- $90 + 40 + 33 \leq 2^8 - 2$
- $166 \leq 254$ (valid)



Subnet mask for A = 255.255.255.128

Subnet mask for B = 255.255.255.192

Subnet mask for C = 255.255.255.192

Both the subnet mask are same for subnet A and B

Hence, option (c) is correct.

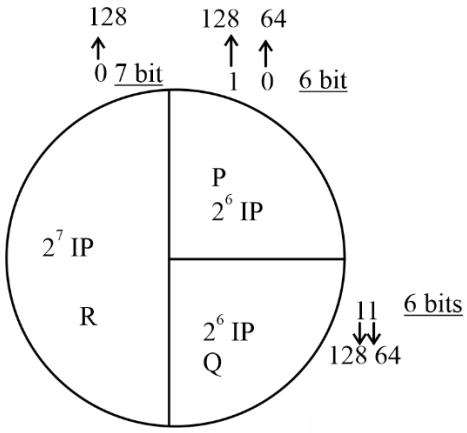
6. (a)

Total hosts = 50 + 40 + 120

= 90 + 120

= 210

$210 \leq 2^8 - 2$ (possible)



Subnet mask for R = 255.255.255.128

Subnet mask for P = 255.255.255.192

Subnet mask for Q = 255.255.255.192

Hence option (a) is correct.

7. (d)

SID of department 4 = 199.198.197.10100000

SID of department 4 = 199.198.197.160

DBA of department 4 = 199.198.197.10111111

= 199.198.197.191

SID of department 5 = 199.198.197.11100000

= 199.198.197.224

DBA of department 5 = 199.198.197.11111111

= 199.178.197.255

Hence option (d) is correct.

8. (c)

SM = 255.255.240.0

= 11111111.11111111 . 11110000

↓ ↓ ↓

NID SID HID

The number of subnets = 2^4

= 16

Hence, Option (c) is correct.

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Computer Network

IPv4 Addressing

DPP 06

[MCQ]

1. Consider a class C IP address with decimal notation 212.212.212.X and subnet ID 212.212.212.64. Then which of the following is valid host ID?

(a) 212.212.212. (64 + X)

(b) 212.212.212. (X – 64)

(c) 212.212.212. (64 – X)

(d) None of these

[MCQ]

2. Suppose, for a network, HID and subnet ID are 196.196.196.1 and 196.196.196.128 respectively. Then which of the following is a valid IP address for given host ID and subnet ID.
(Subnet mask = 255.255.255.248)

(a) 196.196.196.127

(b) 196.196.196.129

(c) 196.196.196.0

(d) None of these

[MCQ]

3. If IP address of the network is 197.197.197.117 and subnet mask 255.255.255.224. Then which of the following is valid subnet ID and host ID respectively?

(a) 197.197.197.96 and 197.197.197.53

(b) 197.197.197.96 and 197.197.197.31

(c) 197.197.197.21 and 197.197.197.96

(d) 197.197.197.96 and 197.197.197.21

[MCQ]

4. Consider IP address of network is 192.192.193.21 and subnet mask contain 29 ones then, what is the host ID?

(a) 192.192.193.16

(b) 192.192.193.15

(c) 192.192.193.5

(d) 192.192.193.1

[MCQ]

5. Suppose, a subnet mask contain 27 ones then how many subnets are possible in class B?

(a) $2^{11} - 2$ (b) 2^3

(c) $2^3 - 2$ (d) 2^{11}

[MSQ]

6. For subnet mask 255.255.248.0 which of the following is/are correct?

(a) Number of subnets in class B are 32.

(b) Number of hosts per subnet are 1022.

(c) Number of IP addresses per subnet are 32.

(d) Number of hosts per subnet are 2046.

[MCQ]

7. Consider the following IP address and subnet mask:
IP address = 198.199.32.176
Subnet mask = 255.255.255.252
Which of the following is subnet ID for given IP address and subnet mask?

(a) 198.199.32.76

(b) 198.199.32.176

(c) 198.199.32.3

(d) None of these

[NAT]

8. For subnet mask 255.255.224.0. How many subnets are possible for class B? _____

[MSQ]

9. Suppose, direct broadcast address of network is 129.129.127.255 then which of the following can be possible subnet mask for given DBA?

(a) 255.255.128.0

(b) 255.255.255.192

(c) 255.254.0.0

(d) 255.254.0.0

[MCQ]

10. A subneted of class B network has the following broadcast address 130.21.95.255. it's subnet mask.

(a) is necessarily 255.255.128.0

(b) is necessarily 255.255.192.0

(c) is necessarily 255.255.255.128

(d) None of these.

Answer Key

1. **(b)**
2. **(b)**
3. **(d)**
4. **(c)**
5. **(d)**
6. **(a, d)**
7. **(b)**
8. **(8)**
9. **(a, b)**
10. **(c)**

Hints & Solutions

1. (b)

IP = 212.212.212.X

SID = 212.212.212.64

Host ID = IP address (last decimal) – Subnet ID (last decimal)

= X – 64

= 212.212.212.(X – 64)

Hence, option (b) is correct.

2. (b)

Host ID = 196.196.196.1

Subnet ID = 196.196.196.128

SM = 255.255.255.248

SID = SM AND IP address

SID = 255.255.255.248

x . y . z . p

196.196.196.128

x = 196

y = 196

z = 196

p = not sure

Host ID = IP address – subnet ID

1= p – 128

p = 129

IP = 196.196.196.129

Hence, option (b) is correct

3. (d)

IP = 197.197.197.117

Sm = 255.255.255.224

Subnet ID = 197.197.197.96

Host ID = 117 – 96

= 21

Host ID 197.197.197.21

Hence, option (d) is correct.

4. (c)

IP address = 192.192.193.21

Subnet mask

= 11111111.11111111.11111111.11111000

Subnet ID = 255.255.255.248

AND

192.192.193.21

192.192.193.16

Subnet ID = 192.192.193.16

Host ID = IP address – SID

= 21 – 16

= 5

Host ID = 192.192.193.5

5. (d)

Subnet mask

= 11111111.11111111.11111111.11100000

= 255 . 255 . 255 . 224

Class B = 16 bits for NID

Number of subnets = 2^{27-16}

= 2^{11}

Hence, option (d) is correct.

6. (a, d)

SM = 255.255.248.0

Number of subnets in class B = 2^5

= 32

Number of hosts per subnet = $2^{11} - 2$

= 2046

Number of IP addresses per subnet = 2^{11}

= 2048

Hence, option (a, d) are correct.

7. (b)

IP address = 198.199.32.176

Subnet mask = 255.255.255.252

255.255.255.11111100

Subnet ID = 198.199.32.10110000

255.255.32.176

Hence, option (b) is correct.

8. (8)

SM = 255.255.224.0

Number of subnets in Class B = 2^3

= 8

9. (a, b)

- Direct broadcast address

  = 129.129.0<u>1111111.11111111</u>

  Host ID bits
- In subnet mask, Host ID bits must be ≤ 15

(a) 255.255.1<u>0000000.00000000</u> **valid**

Host ID bits = 15

(b) 255.255.11111111.11<u>000000</u>

HID = 6

6 ≤ 15 **(valid)**

(c) 255.2<u>54</u>.255.224

× **(invalid)**

Class B by default SM = 255.255.0.0

(d) 255.255.000<u>11111.11111111</u> One's must be contiguous. **(Invalid)**

10. (c)

DBA = 130.32.95.255

= 10000010.00100000.010<u>11111.11111111</u>

13 bit

- In HID part, HID bits ≤ 13

(a) 255.255.1<u>0000000.00000000</u>

HID bits = 15

15 ≰ 13 **(invalid)**

(b) 255.255.11<u>000000.00000000</u>

HID bits = 14

14 ≰ 13**(invalid)**

(c) 255.255.11111111.1<u>0000000</u>

HID bits = 7

7 ≤ 13 **(valid)**

Hence, option (c) is correct.

Branch : CSE & IT Batch : Hinglish

Computer Network

IPv4 Addressing

DPP 07

[MCQ]

1. Consider the subnet mask 255.255.224.0 then which of the following is a valid broadcast address?

(a) 180.180.15.255

(b) 180.180.31.0

(c) 180.180.31.255

(d) 180.180.255.31

[MSQ]

2. Consider a subnet mask for a network is 255.255.255.252. Then, which of the following is/are possible direct broadcast address?

(a) 200.200.200.15

(b) 200.200.200.31

(c) 200.200.200.63

(d) 200.200.200.3

[MSQ]

3. Suppose, direct broadcast address of network is 210.210.210.63 then which of the following is/are always true, for subnet mask?

(a) In subnet mask number of ones are exactly 26.

(b) In subnet mask number of ones are at most 26.

(c) In subnet mask number of ones are at least 26.

(d) In subnet mask Host ID bits are at most 6.

[MCQ]

4. Two computers P_1 and P_2 configured as follows: P1 has IP address 160.170.3.67 and Net mask 255.240.0.0 and P2 has IP address 160.169.80.59 and Net mask 255.248.0.0 which of the following statement is true?

(a) P_1 and P_2 both assume they are on the same network.

(b) P_2 assume P_1 is on same network, but P_1 assume P_2 is on different network.

(c) P_1 assume P_2 is on same network, but P_2 assume P_1 is on different network.

(d) P_1 and P_2 both assume they are on different networks.

[NAT]

5. Consider the routing table given below:

Destination Network ID	Subnet mask	Interface
160.168.16.0	255.255.224.0	1
160.168.128.0	255.255.192.0	2
160.168.48.0	255.255.240.0	3
Default		4

On which interface will the router forward the packet? If packet bearing a destination address 160.168.63.130

_____

[MSQ]

6. Consider the subnet mask 255.224.0.0, then which of the following can be direct broadcast address?

(a) 100.32.255.255

(b) 100.64.255.255

(c) 100.31.255.255

(d) 100.63.255.255

[MSQ]

7. Consider two computers C1 and C2 are configured as follows:

	IP address	Net mask
C1	192.198.2.53	255.255.224.0
C2	192.198.76.99	255.255.192.0

Which of the following statements is/are false?

(a) C1 and C2 both assume they are on the same network.

(b) C2 assumes C1 is on same network, but C1 assumes C2 is on different network.

(c) C1 assumes C2 is on same network, but C2 assumes C1 is on a different network

(d) C1 and C2 both assume they are on different network.

[MCQ]

8. Consider a computer C1 is configured with IP address 203.197.89.99 and netmask 255.255.192.0. The DBA of the network is _____.

(a) 203.197.89.0

(b) 203.197.89.255

(c) 203.197.64.0

(d) 203.197.127.255

Answer Key

1. **(c)**
2. **(a, b, c, d)**
3. **(c, d)**
4. **(a)**
5. **(3)**
6. **(c, d)**
7. **(a, b, c)**
8. **(d)**

Hints & Solutions

1. (c)

SM = 255.255.224.0

HID bits = 13 [last 13 bits must be 1 in DBA]

(a) 180.180.15.255 **Invalid**

(b) 180.180.31.0 **Invalid** because last decimal must be 255.

(c) 180.180.00011111.11111111 **valid**

(d) 180.180.255.31 **Invalid**

2. (a, b, c, d)

SM = 255.255.255.252

SM = 11111111.11111111.11111111.11111100

HID

Given SM is possible for class A, class B and Class C.

HID bits must be 1.

(a) 200.200.200.00000111 **valid**

(b) 200.200.200.00001111 **valid**

(c) 200.200.200.00111111 **valid**

(d) 200.200.200.00000011 **valid**

Hence, all options are correct.

3. (c, d)

Direct broadcast address = 210.210.210.00111111 (class C)

- In subnet mask, host ID bits must be ≤ 6
- If host ID bits are ≤ 6 then, number of ones must be ≥ 26.

Hence, option (c, d) are correct.

4. (a)

For system P1:

IP_{P_1} = 160.170.3.67

SM_{P_1} = 255.240.0.0

For System P2:

IP_{P_2} = 160.169.80.59

SM_{P_2} = 255.248.0.0

- $NID_{P_1P_1} = IP_{P_1}$ AND SM_{P_1}
  = 160.160.0.0
- $NID_{P_2P_1} = IP_{P_2}$ AND SM_{P_1}
  = 160.160.0.0
- P_1 assume, P_2 present in same network
  $NID_{P_1P_2} = IP_{P_1}$ AND SM_{P_2}
  = 160.168.0.0
  $NID_{P_2P_2} = IP_{P_2}$ AND SM_{P_2}
  = 160.168.0.0

P_2 assume, P_1 is in same network.

Hence option (a) is correct.

5. (3)

Destination IP = 160.168.63.130

NID with SM 1:

NID = DIP AND SM_1 (255.255.224.0)

= 160.168.0.0 (Not matched)

NID with SM 2:

NID = DIP AND SM_2 (255.255.192.0)

= 160.168.0.0 (Not matched)

NID with SM 3:

NID = DIP AND SM_3 (255.255.240.0)

= 160.168.48.0 (matched)

Router will send the packet to interface 3.

6. (c, d)

SM = 255.11100000.00000000.00000000

HID bits = 21

- In DBA last 21 bits must be 1

(a) 100.32.255.255 **Invalid**

(b) 100.64.255.255 **Invalid**

(c) 100.31.255.255

100.00011111.11111111.11111111 **Valid**

HID bits

(d) 100.00111111.11111111.11111111 **Valid**

HID bits

7. (a, b, c)

192.198.00000010.00110101
255.255.11100000.00000000
192.198.0.0

192.198.01001100.01100011
255.255.11100000.00000000
192.198.64.0
C1 assume C2 is in different network.

192.198.00000010.00110101
255.255.11100000.00000000
192.198.0.0

192.198.01001100.01100011
255.255.11000000.00000000
192.198.64.0
C2 assume C1 is in different network

∴ Both C1 and C2 assume they are on the different network.

8. (d)

203.197.01011001.01100011
255.255.11000000.00000000

Net ID → 203.197.64.0

DBA → 203.197.127.255

Branch : CSE & IT Batch : Hinglish

Computer Network

IPv4 Addressing

DPP 08

[MCQ]

1. Which of the following is an advantage of classless addressing?

(a) Provide the more IP addresses.

(b) Provide the less IP addresses.

(c) Reduce the wastage of IP addresses

(d) Both (a) and (c)

[NAT]

2. Suppose classless addressing notation of network is 160.79.171.76/20. Then, how many IP addresses is/are possible in the network? _____

[MCQ]

3. Which of the following is correct about classless addressing mode?

(a) Network ID bits and Host bits are same.

(b) Network ID bits are more than the Host ID bits.

(c) Number of IP addresses are same as number of hosts.

(d) None of these.

[NAT]

4. If valid CIDR block is

179.180.190.16
179.180.190.17
179.180.190.18
|
|
|
179.180.190.143

Total number of hosts in above block is/are _____.

[MCQ]

5. Suppose, one of the addresses of block is 19.19.19.72/28. What is the range of IP address?

(a) 19.19.19.0 to 19.19.19.15

(b) 19.19.19.72 to 19.19.19.87

(c) 19.19.19.64 to 19.19.19.79

(d) 19.19.19.64 to 19.19.19.77

[MSQ]

6. Suppose, p.q.r.s/t is valid one of the block. Then which of the following is/are correct about given CIDR notation?

(a) Host ID bits are $\log_2(32 - t)$.

(b) Host ID bits are $(32 - t)$.

(c) Number of hosts are $(2^{32-t} - 2)$

(d) Number of hosts are (2^{32-t}).

[MCQ]

7. Consider an IP address of the block is 184.175.16.16/20. What is the DBA of given IP address?

(a) 184.175.16.31

(b) 184.175.16.255

(c) 184.175.255.255

(d) 184.175.31.255

Answer Key

1. **(c)**
2. **(4096)**
3. **(d)**
4. **(126)**
5. **(c)**
6. **(b, c)**
7. **(d)**

Hints & Solutions

1. (c)

To reduce the wastage of IP addresses concept of classless addressing is used.

2. (4096)

- IP = 160.79.171.76/20
- Number of prefixes bits = 20
- The number of addresses $= 2^{32-20}$
  $= 2^{12}$
  $= 4 \times 1024$
  $= 4096$

3. (d)

- Network ID bits are same as prefix.
- Host ID bits are same as suffix
- IP addresses are more compared to Hosts because in host we have to subtract 2. One is for NID and another for DBA.

4. (126)

Block size $= 143 - 16 + 1$
$= 127 + 1$
$= 128$
$= 2^7$
HID bits $= 7$
Number of hosts $= 2^7 - 2$
$= 126$

5. (c)

IP address = 19.19.19.72/28

IP address = 19.19.19.01001000
HID

NID = 28 bit

HID = 4 bit

The number of addresses in block $= 2^4$
$= 16$

Range of IP address = 19.19.19.01000000
= 19.19.19.01000001
= 19.19.19.01000010
⋮
= 19.19.19.01001111

Range = 19.19.19.64 to 19.19.19.79

6. (b, c)

IP address = p.q.r.s/t

NID bits = t

HID bits = 32 – t

Number of IP address $= 2^{32-t}$

Number of Hosts $= 2^{32-t} - 2$

Hence, option (b, c) are correct.

7. (d)

IP address = 184.175.00010000.00000000
HID bits

NID bits = 20
HID bits = 12
Block ID = 184.175.00010000.00000000
= 184.175.16.0
DBA = 184.175.00011111.11111111
= 184.175.31.255

Hence, option (d) is correct.

Branch : CSE & IT Batch : Hinglish

Computer Network

IPv4 Addressing

DPP 09

[NAT]

1. Suppose, a network 102.105.108.79/26 is divided into 4 subnets. Then the subnet mask contains _____ones.

[NAT]

2. In the network 212.69.78.58/28. The fourth octet (in decimal) of first IP address of the network which can be assigned to a hos? _____.

[MCQ]

3. Consider a hypothetical CIDR based address 212.129.244.87/20. The ISP wants to create 4 subnets for GATE wallah, Physics wallah, Engineers wallah and CA wallah. Which of the following range is possible for GATE Wallah?

SID bits	
00	**Physics wallah**
01	**CA wallah**
10	**GATE wallah**
11	**Engineers wallah**

(a) 212.129.244.254/22 to 212.129.247.255/22

(b) 212.129.240.0/20 to 212.129.248.255/22

(c) 212.129.248.0/22 to 212.129.251.255/22

(d) 212.129.240.0/22 to 212.129.248.255/21

[MSQ]

4. Suppose, a block contains 128 IP addresses, which of the following can be first host address of the block?

(a) 198.174.68.1

(b) 198.174.68.129

(c) 198.174.68.0

(d) 198.174.68.128

[MCQ]

5. A block contains 2048 IP addresses. Which of the following can be first address of the block?

(a) 16.15.19.0

(b) 16.15.16.0

(c) 16.15.20.0

(d) Both (b) and (c)

[NAT]

6. Consider a network 194.193.89.114/28. The last octet (in decimal) of first IP address and last IP address of the network that can be assigned to a host are X and Y respectively then the value of Y – X is _____.

[MCQ]

7. Suppose a CIDR representation is 118.1.3.25/20 what is the range of IP address in the CIDR block?

(a) 118.1.0.0 to 118.1.15.255

(b) 118.1.3.0 to 118.1.3.255

(c) 118.1.2.0 to 118.1.3.254

(d) None of these

[MCQ]

8. An internet service provider (ISP) has the following chunk of CIDR – based IP addresses available with it: 245.248.128.0/20. The ISP wants to give half of this chunk of addresses to organization A, and quarter to organization B, while retaining the remaining with itself. Which of the following is a valid allocation of addresses to A and B?

(a) 245.248.136.0/21 and 245.248.128.0/22

(b) 245.248.128.0/21 and 245.248.128.0/22

(c) 245.248.132.0/21 and 245.248.132.0/21

(d) 245.248.136.0/24 and 245.248.132.0/21

Answer Key

1. **(28)**
2. **(49)**
3. **(c)**
4. **(a, b)**
5. **(b)**
6. **(13)**
7. **(a)**
8. **(a)**

Hints & Solutions

1. (28)

Network = 102.105.108.79/26

NID = 26 bits

To divide the network into 4 subnets 2 bits needed.

SID bits = 2

The number ones in SM = 26 + 2

= 28

2. (49)

IP = 212.69.78.58/28

NID = 28 bit

HID = 4 bit

NID = 212.69.78.58

255.255.255.240

212.69.78.48

First host = 212.69.78.49

Last octet = 49.

3. (c)

IP = 212.129.244.87/20

NID = 20 bit

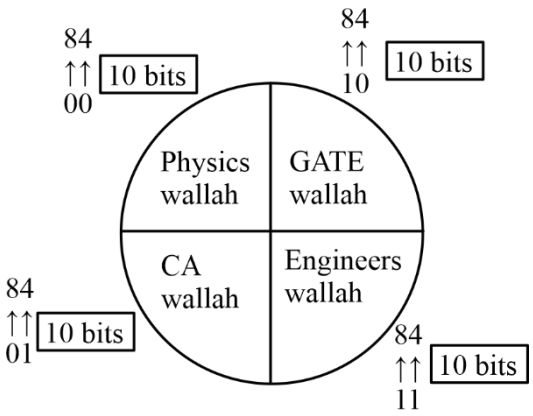
SID = 2 bit

HID = 10 bit

NID = 212.129.11110100.87

255.255.240.0

212.129.240.0



SID for GATE wallah = 212.129.111110 00.00000000

↓ HID (10 bits)

SID GW

SID = 212.129.148.0

First host = 212.129.248.1

Last host = 212.129.11111011.11111110

= 212.129.251.254

DBA = 212.129.251.255

Range = 212.129.248.0 to 212.129.251.255

Hence, option (c) is correct.

4. (a, b)

The number of IP address = 128

= 7 (bit)

- For first host last 7 bit must be 0000001

(a) 198.174.68.0**0000001** valid

(b) 198.174.68.1**0000001** valid

(c) 198.174.68.0**0000000** invalid

(d) 198.174.68.1**0000000** invalid

Hence, options (a, b) are correct.

5. (b)

The number of IP addresses = 2048

= 11 bits

HID bits = 11

Last 11 bits of the network must be 000.00000000.

(a) 16.15.00010**011.00000000** invalid

(b) 16.15.00010**000.00000000** valid

(c) 16.15.00010**100.00000000** invalid

Hence, option (b) is correct.

6. (13)

Network = 194.193.89.114/28

NID = 255.255.255.240

194.193.89.114

194.193.89.112

NID = 194.193.89.01110000

First host = 194.193.89.01110001

Last host = 194.193.89.01111110

DBA = 194.193.89.01111111

Last octet of first host = 01110001

$X = 113$

Last octet of last host = 011111110

$Y = 126$

$Y - X = 126 - 113$

$= 13$

7. (a)

Network = 118.1.3.25/20

NID bits = 20

SID bits = 12

Network ID = 118.1.00000000.00000000

HID

First host = 118.1.00000000.00000001

Last host = 118.1.00001111.11111110

DBA = 118.1.00001111.11111111

Range = 118.1.0.0 to 118.1.15.255

Hence, option (a) is correct.

8. (a)

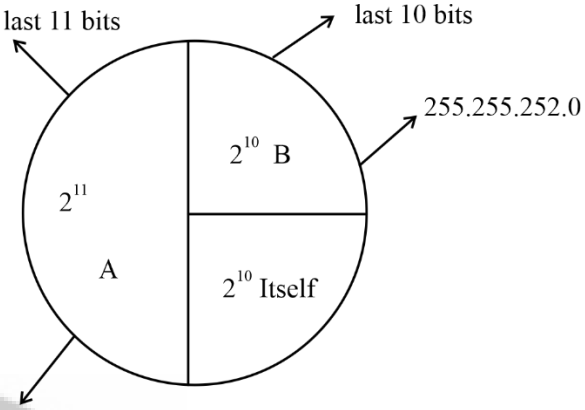
IP = 245.248.128.0

SM = 255.255.240.0

Organization A = 2^{11}

Organization B = 2^{10}

It self = 2^{10}



SM = 255.255.248.0

A = 245.248.136.0/21

B = 245.248.128.0/22

Hence, option (a) is correct.

Branch : CSE & IT Batch : Hinglish

Computer Networks

IPv4 Header & Fragmentation

DPP 01

[MCQ]

1. The protocol field enables the demultiplexing feature so that the IP protocol can be used to carry payload of more than one protocol type. It most used values are 17 and 06 for_____.

(a) UDP and TCP respectively
(b) TCP and UDP respectively
(c) ICMP and IAMP respectively
(d) IGMP and ICMP respectively

[MCQ]

2. Which of the following will be the maximum size of the IPV4 header data packet.

(a) 65536 Bytes (b) 65535 Bytes
(c) 65515 Bytes (d) None of these

[MSQ]

3. What will be incorrect order of the following protocol.

TCP, UDP, IGMP, ICMP

In which router will eliminate the datagram from buffer?

(a) ICMP > IGMP > TCP > UDP
(b) TCP > ICMP > IGMP > UDP
(c) IGMP > ICMP > TCP > UDP
(d) ICMP > IGMP > UDP > TCP

[NAT]

4. Host A sends an IP datagram to host B. Both A and B hosts uses TCP/IPV4 Network. Assume that no error occurred during the transmission of the datagram. When datagram reaches B some of the IP header field may be different from that of original datagram.

Consider the following fields

(i) VER
(ii) HELN
(iii) Total length
(iv) MF
(v) TTL
(vi) Checksum
(vii) Fragment offset
(viii) Services

Assume that among the number of IP header field which will have different values as compare to their original datagram when reached to the destination is x. Then what will be the value of x?

[MCQ]

5. An IP Packet of size 4000 byte has the header length field value as $(1010)_2$. Calculate the size of the payload in the IP Packet.

(a) 4000 Bytes (b) 4040 Bytes
(c) 3980 Bytes (d) 3960 Bytes

Answer Key

1. **(a)**
2. **(c)**
3. **(a,b,c)**
4. **(6)**
5. **(d)**

Hints & Solutions

1. (a)

Protocol	Protocol No.
ICMP	(01)
IGMP	(02)
UDP	(17)
TCP	(06)
OSPF	(89)

2. (c)

IPV4 header

Total length: 16 bits max No. = $2^{16} - 1 = 65535$

Total length = header + data

$= (\text{header})_{min}$ + data

65535 bytes = 20 bytes + data

$\text{Data}_{max} = 65535 - 20$

$\boxed{\text{Data}_{max} = 65515 \text{ bytes}}$

3. (a,b,c)

The correct order is:

$\boxed{\text{ICMP} > \text{IGMP} > \text{UDP} > \text{TCP}}$

4. (6)

Not changed	May be changed	Definitely changed
1.VER	1. Total length	1.TTL
2. Services	2. MF	2. Checksum
3. Identification No.	3. Fragment offset	
4. DF	4. HELN	
5. S.I.P		
6. D.I.P		

5. (d)

IP Packet

Header	Payload

IP Packet = 4000 bytes

Header = $(1010)_2 = 10$

Header length = 10×4 = 40 bytes

Payload= total length (IP Packets) – Header

= (4000B – 40B)

= 3960 Bytes

Branch : CSE & IT **Batch : Hinglish**

Computer Networks

IPv4 Header & Fragmentation

DPP 02

[NAT]

1. An IP router with a maximum transmission unit (MTU) of 1000 bytes has received an IP packet of size 3980 bytes with an IP header of 20 bytes. What will be the value of payload in the second last fragment in bytes.

[MCQ]

2. If the 'fragment offset' field in the IP header has a value of 200 then how many bytes are there before this fragment.

(a) 400 bytes (b) 800 bytes

(c) 1600 bytes (d) 2000 bytes

[NAT]

3. The fragment offset are given as 0, 40, 80, 120. IP header is given as 20 bytes all fragments are of equal size. Calculate the packet size. (in bytes)

[MCQ]

4. An IP datagram of size 2000 bytes arrives at a router. The router than forward this packet on a link with MTU 400 bytes. If the IP header is of size 20 bytes then in how many fragment the packet will get divided ?

(a) 5 (b) 6

(c) 7 (d) 8

[MCQ]

5. In a IP datagram a TCP segments is present header length field of IP datagram is 5 total length of IP datagram is 1000 byte. Header length field in TCP header is 7, then what is the size of TCP data present in the datagram.

(a) 988 (b) 952

(c) 964 (d) 900

Answer Key

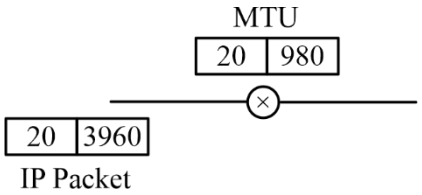
1. **(980 to 980)**
2. **(c)**
3. **(1300 to 1300)**
4. **(b)**
5. **(b)**

Hints & Solutions

1. (980)

MTU = 1000 bytes

Packet size = 3980 bytes



No. of fragments = $\left\lceil \frac{3960}{980} \right\rceil = \lceil 4.04 \rceil = 5$

I[st] fragment	20	980
II[nd] fragment	20	980
III[rd] fragment	20	980
IV[th] fragment	20	980
V[th] fragment	20	40 + 8 → Padded bytes

Payload size in IV[th] (second last) fragment = 980 bytes.

2. (c)

Fragment offset field uses scaling factor of 8.

Fragment offset field value = 200

Fragment offset = 200 × 8 = 1600

Hence, 1600 bytes are ahead of this fragment.

3. (1300 to 1300)

Fragment offset

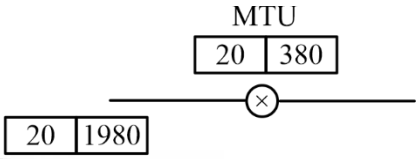
0 – 39 40 – 79 80 – 119 120 – 159

Payload = 40 × 8 = 320 bytes

IP Packet size = 320 × 4 + 20 = 1300 bytes.

4. (b)

IP datagram = 2000 bytes



Number of fragments = $\left\lceil \frac{1980}{380} \right\rceil = \lceil 5.21 \rceil = 6$

5. (b)

Total length of IP datagram = 1000 bytes

Header length field of IP datagram = 5

Size of IP header = 5 × 4

= 20 bytes

TCP header = 7

TCP header size = 7 ×4

= 28 bytes

TCP data = 1000 – (20 + 28)

= 952 bytes

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Computer Networks

Medium Access Control

DPP 01

[MCQ]

1. In ethernet, the source address field in the MAC frame is the _____address.

(a) Original sender's Physical

(b) Previous station's Physical

(c) Next destination Physical

(d) Original sender's Service

[MCQ]

2. After the k^{th} consecutive collision, each colliding station waits for a random time chosen for the internal_____.

(a) (0 to 2^k) × RTT

(b) (0 to $2^k - 1$) × RTT

(c) (0 to $2^k - 1$) × maximum propagation Delay

(d) (0 to 2^{k-1}) × maximum propagation Delay

[NAT]

3. A group of N stations share 50 Kbps slotted ALOHA channel. Each station outputs is 500 bits frame on an average of once 5000ms, even if previous one has not been sent. What is the maximum value of N?

[MCQ]

4. Suppose that 'N' ethernet stations, all trying to sent at the same time, requires $\frac{N}{2}$ slot times to sort out who transmits next. Assuming the average packet size is 5 slot times, express the utilization of ethernet as a function of N.

(a) $\frac{10}{N}$ (b) $\frac{10}{5+N}$

(c) $\frac{5}{N+10}$ (d) $\frac{10}{10+N}$

[MSQ]

5. Which of the following is NOT true about slotted ALOHA?

(a) Divide time into discrete intervals.

(b) Require global time synchronization

(c) Does not dived time into discrete intervals

(d) None of the above

Answer Key

1. **(b)**
2. **(b)**
3. **(368 to 368)**
4. **(d)**
5. **(b,c)**

Hints & Solutions

1. (b)

While the IP Address of source and the destination in a datagram is kept same at each hop, the source MAC address is replaced at each station while the frame is in transit. So for the current station, the source address field will contain the MAC address of the previous station.

2. (b)

Option 'b' is correct option.

3. (368 to 368)

5000×10^{-3} sec……..500 bits

1 sec…….. $\frac{500}{5000\times10^{-3}} bits$

1 sec……..100 bits

Throughput each station = 100 bits/sec.

Through put of slotted ALOHA = 0.368 × 100 Kbps

So,

N × through put of each station = $0.368 \times 100\times10^{3}$ bit/sec.

N × 100 bits/sec. = 368 ×100 bits/sec.

N = 368

4. (d)

$$\text{Utilization} = \frac{\text{Utilization time}}{\text{Total time}} = \left(\frac{5}{5+\frac{N}{2}}\right) = \frac{10}{10+N}$$

5. (b,c)

Slotted ALOHA divides time into discrete intervals and it does not require global time synchronization.

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Computer Networks

TCP & UDP

DPP 01

[MSQ]

1. which of the following statements is/are true regarding TCP header?

(a) The range of TCP header length field value is always [5, 15]

(b) The range of TCP header length is always [20, 60]

(c) The range of TCP header length field value is always [0 – 15]

(d) The range of TCP header length is always [0 – 60]

[MCQ]

2. What is the purpose of using PSH bit in TCP header?

(a) PSH bit is used to treat certain data on an urgent basis.

(b) PSH bit indicates whether acknowledgement number field is valid or not.

(c) PSH bit is to push the entire buffer immediately to the receiving application.

(d) None of the above.

[NAT]

3. Consider the following statements:

S_1: RST bit is used to reset the TCP connection.

S_2: When RST bit is set to 1, it indicates the receiver to terminate the connection immediately.

S_3: When RST bit is set to 1 it may result in the loss of data that is in transit.

S_4: SYN bit us used to synchronize the sequence number.

How many are the true statements?

[MCQ]

4. Match the Following:

Field in TCP header	Length in bits
1. Sequence number	A : 16
2. Reserved bits	B : 4
3. Header length	C : 32
4. Advertisement window	D : 6

(a) 1 – A, 2 – B, 3 – C, 4 – D

(b) 1 – C, 2 – D, 3 – B, 4 – A

(c) 1 – C, 2 – D, 3 – A, 4 – B

(d) 1 – A, 2 – B, 3 – D, 4 – C

[MCQ]

5. Which of the following is not a field in TCP header?

(a) Sequence Number

(b) Checksum

(c) Fragment offset

(d) Window size.

[MCQ]

6. The maximum pagload of TCP segment is:

(a) 65, 535 (b) 65, 495

(c) 65, 515 (d) 65, 475

Answer Key

1. **(a, b)**
2. **(c)**
3. **(4 to 4)**
4. **(b)**
5. **(c)**
6. **(65495)**

Hints & Solutions

1. (a, b)

TCP header length field value range

$(0101)_2$	$(1111)_1$
↓	↓
5	15
Header length 5×4	15×4
$= 20$ bytes	$= 60$ bytes

2. (c)

Option A : It's true regarding URG bit of TCP header
Option B : It's true regarding ACK bit of TCP header
Option C : True.

3. (4 to 4)

- All the given statements are true statements.

4. (b)

Sequence Number – 32
Reserved bits – 6
Header length – 4
Advertisement window – 16

5. (c)

Fragment offset is not a field of TCP header.

6. (65495)

Pagload = window size – min header size (TCP + IP)
$= 65535 - (20 + 20)$
$= 65535 - 40$
$= 65495$

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Computer Networks

TCP & UDP

DPP 02

[NAT]

1. Given the bandwidth of a network is 512MB/sec. Calculate the wrap around time? (in sec upto 2 decimal places)

[MCQ]

2. Which of the following statements is true regarding wrap around time in transport layer protocol?

(a) It's a time to use upto 2^{32} ports number.

(b) It's a time to use upto 2^{32} sequence number.

(c) It's a time to use upto 2^{32} bits of data.

(d) None of the above.

[NAT]

3. Consider a long – lived TCP session with an end to end bandwidth of 1.5 GB/sec. The session start with a sequence number 8328. The minimum time before this sequence number can be used again is ____second. (Rounded to the closest integer.)

[MSQ]

4. Which of the following conditions are true to avoid wrap around time? (B = Bandwidth)

(a) Minimum sequence number required to avoid wrap around with in the lifetime = 2 × life time × B

(b) Minimum sequence number required to avoid wrap around with in the lifetime = lifetime × B

(c) Minimum number of bits required in the sequence number field to avoid wrap around with in life time = $\lceil \log_2(\text{lifetime}) \times B \rceil$

(d) None of the above.

[MCQ]

5. Consider 400 Mbps network with a sequence number field 30 bits. The wrap around time of the sequence number is _____.

Answer Key

1. **(8.36 to 8.39)**
2. **(b)**
3. **(23 to 23)**
4. **(b, c)**
5. **(21.47)**

Hints & Solutions

1. (8.36 to 8.39)

Bandwidth = 512 MB/sec
= 512×10^6 Bytes/sec.
Means 512×10^6 bytes of data transfer – 1 sec.
For generating 2^{32} bytes of data
Transfer time (wrap around time)

Will be = $\frac{2^{32} \text{ bytes}}{512 \times 10^6 \text{ Bytes / sec}}$

= 8.38860 sec.

2. (b)

Wrap around time is a time taken to use all 2^{32}-sequence number.

3. (23 to 23)

Bandwidth = 1.5 GB/sec

= 1.5×10^9 bits sec

When the same sequence will be generated again actually have it asking as to calculate the wrap around time indirectly.

Wrap around time = $\frac{2^{32} \text{ bytes}}{1.5 \times 10^9 \text{ bits / sec}}$

= $\frac{2^{32} \times 8 \text{ bits}}{1.5 \times 10^9 \text{ bits / sec}}$

= 22.906492

4. (b, c)

Only option b and c are correct condition to avoid wrap around time.

5. (21.47)

B = 400 Mbps

= 400×10^6 bits / sec

= $\frac{400 \times 10^6}{8}$ bytes/sec

= 50×10^6 bytes/sec

Sequence number = 29 bits

= 50×10^6 byte – 1 sec

1 byte = $\frac{1}{30 \times 10^6}$ sec

1 sequence number = $\frac{1}{50 \times 10^6}$ sec

2^{30} sequence number = $\frac{2^{30}}{50 \times 10^6}$

= 21.47 sec

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Computer Networks

TCP & UDP

DPP 03

[MCQ]

1. Which of the following control filed in TCP header is used to specify whether to sender has no more data to transmit?

(a) FIN (b) RST

(c) SYN (d) PSH

[MCQ]

2. An ACK number of 500 in TCP always means.

(a) 499 bytes have been successfully received.

(b) 500 bytes have been successfully received.

(c) 501 bytes have been successfully received.

(d) None of the above.

[MSQ]

3. Which of the following statement(s) is/are true?

(a) A SYN segment can carry data and consumes one sequence number.

(b) A SYN segment can't carry data, but consumes are sequence number.

(c) A SYN + ACK segment can carry data, and consumes one sequence number.

(d) A SYN + ACK segment can't carry data, but consumes one sequence number.

[MCQ]

4. In TCP state transition diagram what will be the correct order of states in which the client will move while establishment the connection with TCP secure.

(a) SYN-SENT→ESTABLSHED → FIN-WAIT 1 → FIN-WAIT 2 → LAST-ACK

(b) SYN-SENT → ESTABLSHED →FIN-WAIT 1 → FIN-WAIT 2 → TIME-WAIT

(c) SYN-SENT→SYN-RCVD → FIN-WAIT 1 → FIN-WAIT 2 → TIME-WAIT

(d) None of these

[MCQ]

5. Consider a TCP state transition diagram which of the following state is also called 2 MSL wait time state? (MSL = Maximum Segment Lifeline)

(a) FIN- WAIT 2 (b) TIME -WAIT

(c) CLOSE - WAIT (d) LAST- ACK

[NAT]

6. Consider the following statements:

S_1: TCP can accept out of order segments but always sends in order acknowledgment.

S_2: TCP connection is full duplex connection for example data can be sent in both the direction.

S_3: In TCP for complete connection establishment 3-way handshaking is required.

S_4: For complete connection establishment and connection release control segment are transmitted where as in data transfer phase data segment are transmitted.

The total number of correct statements will be_____.

Answer Key

1. **(a)**
2. **(a)**
3. **(b,d)**
4. **(b)**
5. **(b)**
6. **(4 to 4)**

Hints & Solutions

1. (a)
FIN control field of TCP header indicates the end of data transmission.

2. (a)
If X bytes has been received by receiver than ACK number will be X+ 1.

3. (b, d)
SYN and SYN + ACK segment do not carry data, but both consume a sequence number.

4. (b)
The order of states in which client will move.

SYN – SENT → ESTABLISHED → FIN-WAIT 1 → FIN -WAIT 2 → TIME -WAIT → CLOSE STATE.

5. (b)
TIME-WAIT is also known as the 2MSL state. This is because the socket that transition to TIME-WAIT stage there for a period that is 2 x maximum segment lifeline in duration.

6. (4 to 4)
All statement are correct.