CS & IT ENGINEERING

COMPUTER NETWORKS

IPv4 Addressing

Lecture No-17

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Problem Solving on Subnetting

Problem Solving on Subnetting Part – 3

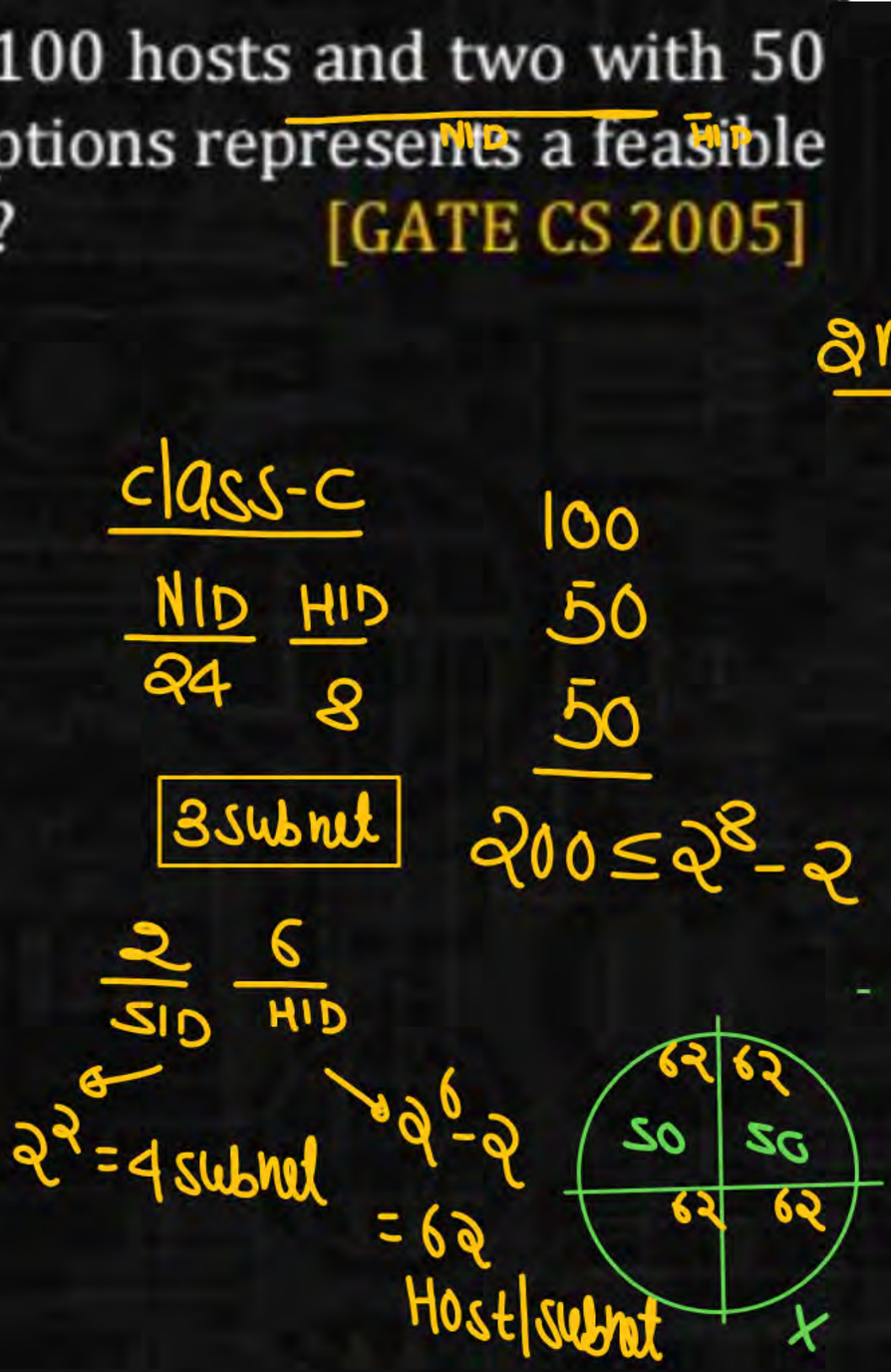
Q.1 wishes to have three subnets, one with 100 hosts and two with 50 hosts each. Which one of the following options represents a feasible set of subnet address/subnet mask pairs? [GATE CS 2005]

A. ✗
204.204.204.128/255.255.255.192
204.204.204.0/255.255.255.128
204.204.204.64/255.255.255.128

B. ✗
204.204.204.0/255.255.255.192
204.204.204.192/255.255.255.128
204.204.204.64/255.255.255.128

C. ✗
204.204.204.128/255.255.255.128
204.204.204.192/255.255.255.192
204.204.204.224/255.255.255.192

D. ✓
04.204.204.128/255.255.255.128
204.204.204.64/255.255.255.192
204.204.204.0/255.255.255.192



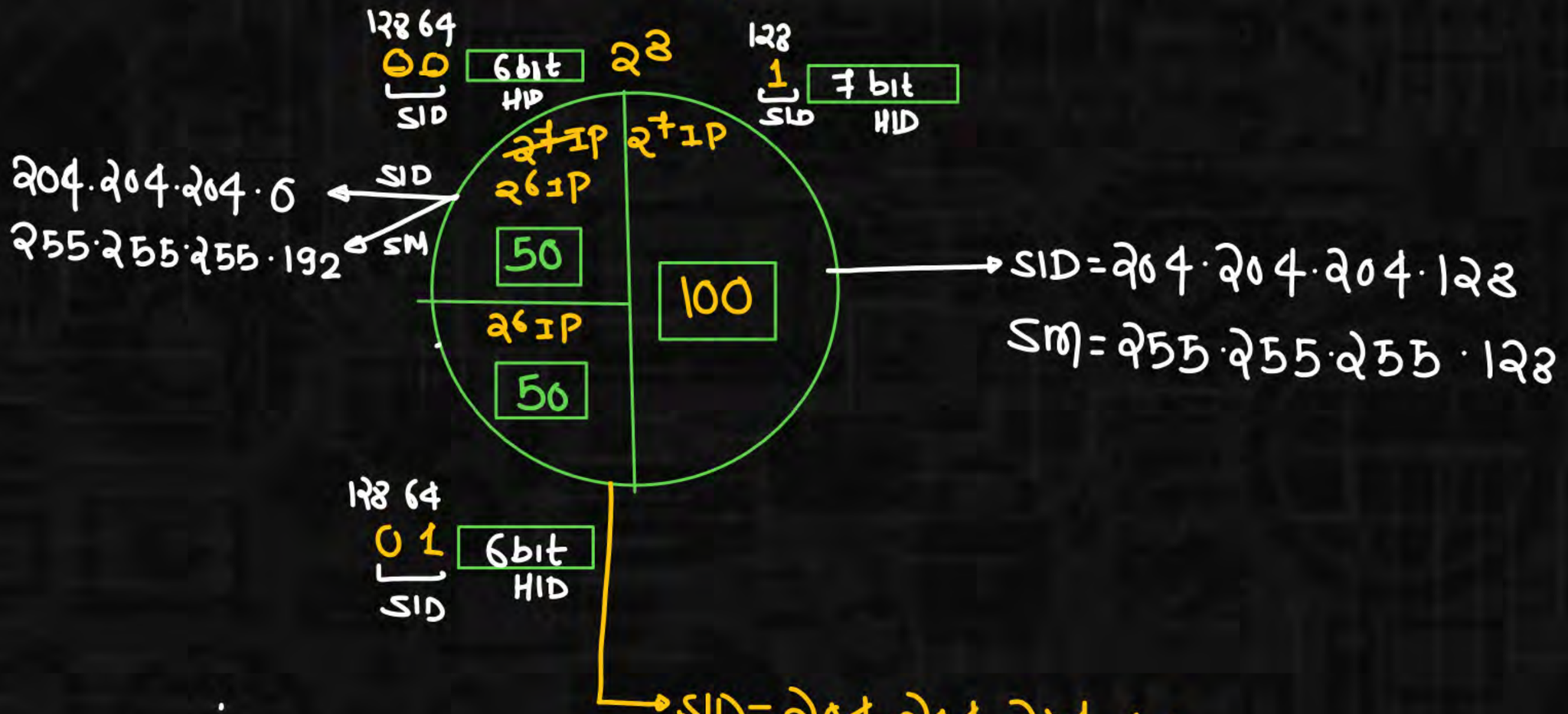
VLSM technique

SID = 204.204.204.128
SM = 255.255.255.192(128+64)

SID = 204.204.204.0
SM = 255.255.255.128

SID: 204.204.204.192
SM = 255.255.255.192(128+64)

OR


128 64
00
SID
6bit
HID
2^8
128
1
SID
7 bit
HID
2^7 IP
2^7 IP
2^6 IP
50
2^6 IP
50
100
204.204.204.0
255.255.255.192
SID
SM
SID=204.204.204.128
SM=255.255.255.128
128 64
01
SID
6bit
HID
SID=204.204.204.64
SM=255.255.255.192

Q.2 Consider the class-c Network with 7 subnets and 25 Host per subnet. What will be the subnet mask for this network

MSQ

A. 255.255.255.224 (11100000)

B. 255.255.255.44 (00101100)

C. 255.255.255.63 [00111111]

D. 255.255.255.112 [01110000]

8 + 8 + 8 + 3 = 27 → 1's

8 + 8 + 8 + 3 = 27 → 1's

8 + 8 + 8 + 6 = 30 → 1's

8 + 8 + 8 + 3 = 27 → 1's

$7 * 25 \leq 2^8 - 2$

$175 \leq 254$ (yes)

Class-C

NID	HID
24	8

7 subnet

24	3	5
NID	SID	HID

No. of 1's in the S.M = NID + SID = 24 + 3 = 27

No. of 0's in S.M = HID = 5

Q.3 Consider the class-B Network with 180 subnets and 200 Host per subnet. What will be the subnet mask for this network

MSQ

$180 * 200 \leq 2^{16} - 2$

$36{,}000 \leq 2^{16} - 2$ (yes)

class-B

NID	HID
16	16

180 subnet

16	8	8
NID	SID	HID

No. of 1's in the SM = NID + SID = 16 + 8 = 24

No. of 0's in SM = HID = 8

A. 255.255.255.0

$8 + 8 + 8 = 24 \rightarrow$ 1's ✓

B. 255.255.240.240

$8 + 8 + 4 + 4 = 24 \rightarrow$ 1's ✓

C. 255.255.252.112

$8 + 8 + 6 + 3 = 25 \rightarrow$ 1's ✗

255.255.1111100.01110000

D. 255.255.252.192

$8 + 8 + 6 + 2 = 24 \rightarrow$ 1's ✓

(A, B, D)

Q.4 Using the IP address 172.168.42.58 and subnet mask 255.255.252.0, identify the correct subnet ID and directed broadcast address.

(Assuming Classful addressing scheme is followed).

A. The correct Network ID is 172.168.40.0, and the broadcast address is 172.168.255.255

B. The correct Network ID is 172.168.40.0, and the broadcast address is 172.168.43.255

C. The correct Network ID is 172.168.40.0, and the broadcast address is 172.168.44.255

D. The correct Network ID is 172.168.40.0, and the broadcast address is 172.169.43.255

SM: 255.255.11111100.00000000

NID SID HID

172.168.001010--.--------

SID HID

172.168.00101000.00000000 → 172.168.40.0 (NID)

172.168.00101011.11111111 → 172.168.43.255 (DBA)

Q.5 Suppose a subnetwork X has a subnet mask 255.255.255.192 on a host address on 'c' is 130.127.48.130. Which of the following is on the same subnet with 'y'?

A. 130.127.48.120

B. 130.127.48.187

C. Both A and B

D. None of the above

Soln: 130.127.48.10000010
AND
255.255.255.11000000
SID = 130.127.48.128

(a) 130.127.48.01111000
AND
255.255.255.11000000
SID = 130.127.48.64

(b) 130.127.48.10111011

AND

255.255.255.11000000

SID = 130.127.48.128

ADRule 2.0

255.255.255.11000000

NID SID SID

128 64

130 : 1 0

190 : 0 1

187 : 1 0

belong to same Network

Q.6 In IP(V_4), class B network (Net ID is 150.50.0.0). What are the first and last IP Addresses of hosts?

A. 150.51.0.1 and 150.50.255.254

B. 150.50.0.1 and 150.50.255.254 ✓

C. 150.50.0.1 and 100.50.255.254

D. 150.0.0.1 and 150.0.255.250

150.50.0.0
NID HID

FirstHost : 150.50.00000000.00000001
150.50.0.1

LastHost : 150.50.11111111.11111110
150.50.255.254

Q.7 Consider the following IP address 200.48.67.184 and subnet mask 255.255.255.240, what is the IP address of last host of subnet to which given IP address belongs?

↳ class-C

A. 200.48.67.192

B. 200.48.67.190

C. 200.48.67.255

D. 200.48.67.254

SM : 255.255.255.1111 0000
NID SID HID

200.48.67.1011 ----
SID HID

200.48.67.1011 1110 → 200.48.67.190
SID

255
255
192

Q.8

A company has a class C network address of 204.204.204.0. It wishes to have three subnets(X ,Y,Z) X with 100 hosts ,Y with 50 hosts and Z with 50 host. Which one of the following options represents a feasible set of subnet address/subnet mask pairs?

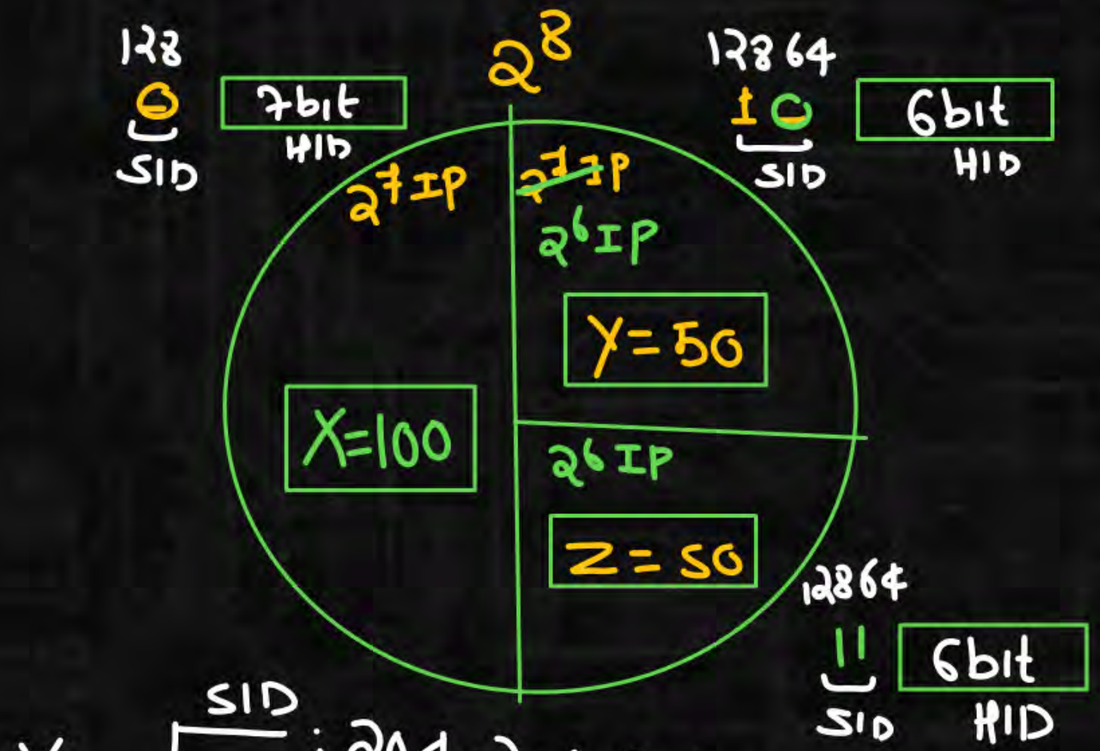
MSQ

A. X-204.204.204.0/255.255.255.128
Y-204.204.204.128/255.255.255.192
Z-204.204.204.192/255.255.255.192

B. X-204.204.204.0/255.255.255.128
Y-204.204.204.192/255.255.255.192
Z-204.204.204.128/255.255.255.192

C. X-204.204.204.128/255.255.255.128
Y-204.204.204.0/255.255.255.192
Z-204.204.204.64/255.255.255.192

D. X-204.204.204.128/255.255.255.128
Y-204.204.204.64/255.255.255.192
Z-204.204.204.0/255.255.255.192

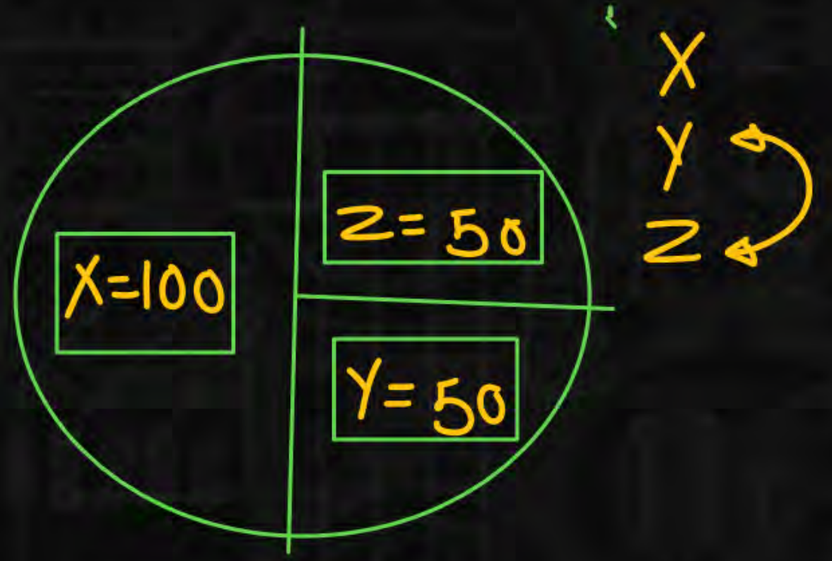


X — SID : 204.204.204.0
SM : 255.255.255.128

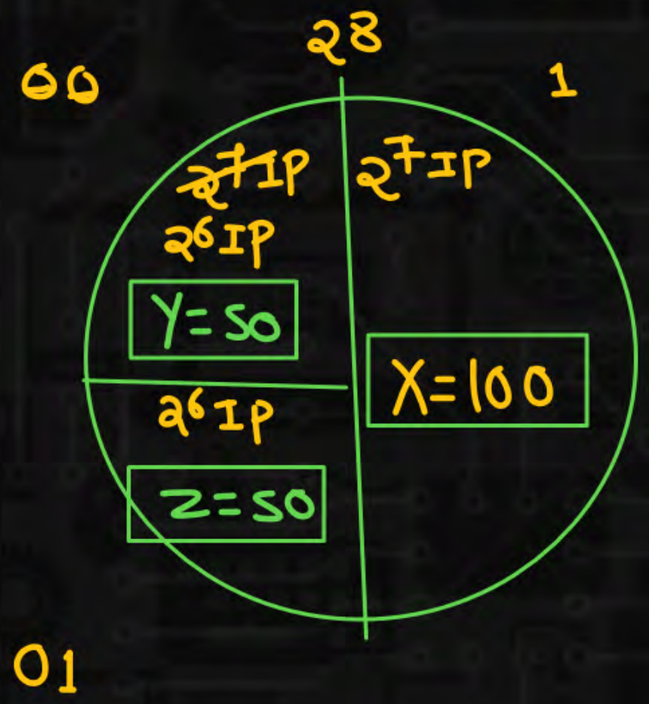
Y — SID : 204.204.204.128
SM : 255.255.255.192

Z — SID : 204.204.204.192
SM : 255.255.255.192

OR



OR



Q.9 In a class B subnet, we know the IP address of one host and the mask as given below:

IP address: 125.134.112.66

Mask: 255.255.224.0

What is the first address (Network address)?

A. 125.134.96.0

B. 125.134.112.0

C. 125.134.112.66

D. 125.134.0.0

64+32+16

128+64+32

IPAdd = 125.134.112.66

AND

Mask = 255.255.224.0

NID = 125.134.96.0

OR

255.255.111|00000.00000000

NID SID HID

125.34.011 ----------

HID

125.34.011|00000.00000000 → 125.34.96.0

Q.10 Which of following IPs may belong to last host of any subnet if subnet mask is 255.255.255.224

I. 210.15.16.62 [00111110]

II. 210.15.16.94 [01011110]

III. 210.15.16.127 [01111111]

IV. 210.15.16.191 [10111111]

255.255.255.11100000
NID NID SID HID

000 11110 → 30
001 11110 → 62
010 11110 → 94
011 11110 → 126
100 11110 → 158
101 11110 → 190
110 11110 → 222
111 11110 → 254

HID
Last Host : 11110

A. I and II

B. I and III

C. II and IV

D. III and IV

Q.11

MSQ

Given the following:
Host IP address: 192.168.100.66, with 3 bits of subnetting.
Which of the following is/are true for the above network and host?

class-C

NID	HID
24	8

NID	SID	HID
24	3	5

A. The subnet address to which this host belongs is 192.168.100.32

B. The subnet address to which this host belongs is 192.168.100.64

C. Broadcast address is 192.168.100.255

D. Valid host range is 192.168.100.65 to 192.168.100.94

(B, D)

192.168.100.010 ------
NID SID HID

192.168.100.010 00000 → 192.168.100.64 (SID)

192.168.100.010 00001 → 192.168.100.65
First Host

⋮

192.168.100.010 11110 → 192.168.100.94
Last Host

192.168.100.010 11111 → 192.168.100.95 (DBA)

Valid Host range

Q.12 In the Class C, if Subnet mask is 255.255.255.224 and the number of subnet is X and the Number of host in each subnet is Y, then X+Y is?

NAT

Ans: 38

Q.13 Consider an organization with a class B network address of 150.65.0.0. Which of the following net masks should not be used to divide this into 100 sub networks? MSQ

H.W

A. 255.255.224.0 — 8+8+3 = 19 → 1's

B. 255.255.248.0 — 8+8+5 = 21 → 1's

C. 255.255.252.0 — 8+8+6 = 22 → 1's

D. 255.255.254.0 — 8+8+7 = 23 → 1's

class-B

NID	HID
16	16

100 subnet

NID	SID	HID
16	7	9

No. of 1's in SM = NID + SID = 16 + 7 = 23

Q.14 An organization is granted a Class B network 150.36.0.0. The administrator wants to create 512 subnets. Find the number of hosts in each subnet----

H.W


THANK YOU
GW
SOLDIERS !