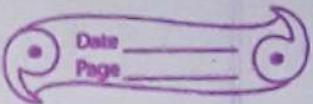


# Subnetting

1

Class C



192.168.0.0 /25

⇒ 1) New subnet mask.

255.255.255.10000000

⇒ 255.255.255.128

2) No. of Network  $\Rightarrow 2^{\text{off}} \text{ (where } \text{off} = \text{on bit)} = 2^1 = 2$

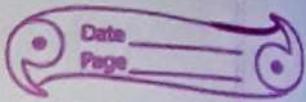
3) No. of Valid Host per network  $= 2^{\text{on}} - 2 \text{ (where on = off bit)} = 2^7 - 2 = 126$

4) Block size / Jumping value / Magic Number :

⇒ 256 - new subnet mask last non-zero value

⇒ 256 - 128

⇒ 128



5) calculate subnet Table:

Nid	Valid IP			Bid
	1 <sup>st</sup> ip	...	last ip	
192.168.0.0	192.168.0.1	...	192.168.0.126	192.168.0.127
192.168.0.128	192.168.0.129	...	192.168.0.254	192.168.0.255

2) 192.168.0.0 126

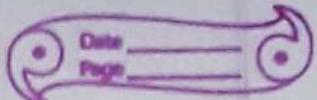
1) New subnet mask

255.255.255.11000000

→ 255.255.255.192

$$\begin{aligned}
 2) \text{ No. of Network} &\Rightarrow 2^n \quad (\text{where } n = \text{on bit}) \\
 &= 2^2 \\
 &= 4
 \end{aligned}$$

$$\begin{aligned}
 3) \text{ No. of valid host per network} &= 2^4 - 2 \\
 &= 2^6 - 2 \\
 &= 64 - 2 \\
 &= 62
 \end{aligned}$$



4.) Block size / Jumping Value / magic Number

$$\Rightarrow 256 - 192$$

$$\Rightarrow 64$$

5) calculate subnet table

Network id	Start ip	---	end ip	Broadcast id
192.168.0.0	192.168.0.1	- - -	192.168.0.62	192.168.0.63
192.168.0.64	192.168.0.65	- - -	192.168.0.126	192.168.0.127
192.168.0.128	192.168.0.129	- - -	192.168.0.190	192.168.0.191
192.168.0.192	192.168.0.193	- - -	192.168.0.254	192.168.0.255

3) 192.168.0.0 127

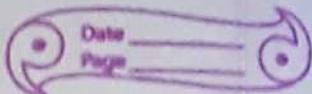
$\Rightarrow$

1.) calculate new subnet mask

255.255.255.11100000

$\Rightarrow$  255.255.255.224

$$\begin{aligned}
 2) \text{ no. of network} &= 2^7 \\
 &= 2^3 \\
 &= 8
 \end{aligned}$$



$$\begin{aligned}
 3.) \text{ no. of valid host per network} &= 2^H - 2 \\
 &= 2^5 - 2 \\
 &= 32 - 2 \\
 &= 30
 \end{aligned}$$

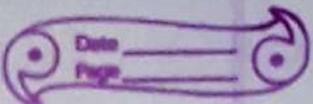
4.) Block size / jumping value (magic number)

$$\Rightarrow 256 - 224$$

$$\Rightarrow 32$$

5.) calculate subnet table

Network id	1st ip	... .	last ip	Broadcast fd
192.168.0.0	192.168.0.1	---	192.168.0.30	192.168.0.39
192.168.0.32	.33	---	.62	192.168.0.63
192.168.0.64	.65	---	.94	192.168.0.95
192.168.0.96	.97	---	.126	192.168.0.127
192.168.0.128	.129	---	.158	192.168.0.159
192.168.0.160	.161	---	.190	192.168.0.191
192.168.0.192	.193	---	.222	192.168.0.223
192.168.0.224	.225	---	.254	192.168.0.255
<del>192.168.0.255</del>				



Q) 192.168.0.0 128

1) New subnet mask

255.255.255.11110000

$\Rightarrow$  255.255.255.240

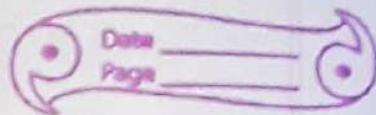
$$\begin{aligned} 2) \text{ no. of network} &= 2^n \\ &= 2^4 \\ &= 16 \end{aligned}$$

$$\begin{aligned} 3) \text{ no. of Valid host} &= 2^H - 2 \\ &= 2^4 - 2 \\ &= 16 - 2 \\ &= 14 \end{aligned}$$

4) Block size / jumping value / magic number

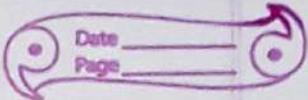
$\Rightarrow$  256 - 240

$\Rightarrow$  16



### 5) calculate Subnet table

Nid	1st ip	- - -	Last ip	8id
192.168.0.0	192.168.0.1	- . .	192.168.0.14	192.168.0.15
192.168.0.16	· 17	- - .	· 30	192.168.0.31
192.168.0.32	· 33	- - .	· 46	· 47
192.168.0.48	· 49	- - .	· 62	· 63
192.168.0.64	· 65	- - .	· 78	· 79
192.168.0.80	· 81	- - .	· 94	· 95
· 96	· 97	- - -	· 110	· 111
· 112	· 113	- - -	· 126	· 127
· 128	· 129	- - .	· 142	· 143
· 144	· 145	- - .	· 158	· 159
· 160	· 161	- - .	· 174	· 175
· 176	· 177	- - -	· 190	· 191
· 192	· 193	- - -	· 206	· 207
· 208	· 209	- - -	· 222	· 223
· 224	· 225	- - -	· 238	· 239
· 240	· 241	- - -	· 254	· 255



5.) 192.168.0.0 /29

1.) New Subnet mask

255.255.255.11111000

$\Rightarrow$  255.255.255.248

$$\begin{aligned} 2.) \text{ no. of network} &= 2^n \\ &= 2^5 \\ &= 32 \end{aligned}$$

$$\begin{aligned} 3.) \text{ no. of valid Host per network} &= 2^k - 2 \\ &= 2^3 - 2 \\ &= 8 - 2 \\ &= 6 \end{aligned}$$

4.) Block size / Jumping value / magic number

$\Rightarrow$  256 - 248

$\Rightarrow$  8

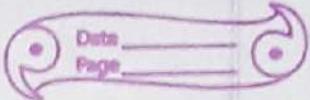
## 5) Subnet table

Nid	1st ip	---	last ip	Bid
192.168.0.0	.1	---	.6	192.168.0.7
192.168.0.8	.9	---	.14	192.168.0.18
192.168.0.16	.17	---	.22	192.168.0.23
192.168.0.24	.25	---	.30	31
192.168.0.32	.33	---	.38	39
192.168.0.40	.41	---	.46	47
192.168.0.48	.49	---	.54	55
:	:	:	:	:
:	:	:	:	:
192.168.0.224	.225	---	.230	231
192.168.0.232	.233	---	.238	239
192.168.0.240	.241	---	.246	247
192.168.0.248	.249	---	.254	192.168.0.2545

6) 192.168.0.0 /30

1.) new subnetmask

255.255.255.11111100  
 $\Rightarrow$  255.255.255.11111100



$$\begin{aligned}
 2) \text{ no. of networks} &= 2^7 \\
 &= 2^6 \\
 &= 64
 \end{aligned}$$

$$\begin{aligned}
 3) \text{ no. of valid host per network} &= 2^H - 2 \\
 &= 2^2 - 2 \\
 &= 4 - 2 \\
 &= 2
 \end{aligned}$$

4.) Jumping value

$$\Rightarrow 256 - 252$$

$$\Rightarrow 4$$

### 5) Subnet table

NID	1 <sup>st</sup> ip	last ip	Bid
192.168.0.0	0.1	- - -	192.168.0.03
192.168.0.4	0.5	- - -	192.168.0.7
192.168.0.8	0.9	- - -	192.168.0.11
192.168.0.12	0.13	- - -	192.168.0.15
:	:	:	:
192.168.0.244	0.245	- - -	192.168.0.247
192.168.0.248	0.249	- - -	192.168.0.251
192.168.0.252	0.253	- - -	192.168.0.255

7) 192.168.0.0 /31

a) New subnet mask

$255.255.255.11111110$

$\Rightarrow 255.255.255.254$

$$\begin{aligned} b) \text{ no. of network} &= 2^7 \\ &= 2^7 \\ &= 128 \end{aligned}$$

$$\begin{aligned} c) \text{ no. or valid host per network} &= 2^6 - 2 \\ &= 2^6 - 2 \\ &= 62 \end{aligned}$$

d.) Jumping value

$\Rightarrow 256 - 254$

$\Rightarrow 2$

## (c) Subnet table

Nid	1st ip	last ip	Bid
192.168.0.0			192.168.0.1
192.168.0.2			192.168.0.3
192.168.0.4			192.168.0.5
:			:
192.168.0.248			192.168.0.249
192.168.0.250			192.168.0.251
192.168.0.252			192.168.0.253
192.168.0.254			192.168.0.255

8) 192.168.0.0 /32

a) New subnetmask:

$$\begin{aligned} &255.255.255.11111111 \\ \Rightarrow &255.255.255.255 \end{aligned}$$

$$\begin{aligned} b) \text{No of Network} &= 2^n \\ &= 2^8 \\ &= 256 \end{aligned}$$

$$\begin{aligned} c) \text{No of host per network} &= \cancel{256} 2^{11-2} \\ &= 2^9 - 2 \\ &= 512 - 2 \\ &= 510 \end{aligned}$$

class -B

1) 172.168.0.0 117

a) New subnet mask

$$\Rightarrow 255.255.10000000.00000000$$

$$\Rightarrow 255.255.128.0$$

b) no. of networks =  $2^n$  (where n = no. of bits)

$$\begin{aligned} &= 2^1 \\ &= 2 \end{aligned}$$

c) no. of valid host per network =  $2^H - 2$  ( $H = \text{off bit}$ )

$$\begin{aligned} &= 2^5 - 2 \\ &= 32766 \end{aligned}$$

d) Jumping value ~~128~~

$$\Rightarrow 256 - 128$$

$$\Rightarrow 128$$

## e) Subnetting Table

NID	1 <sup>st</sup> ip . . . . .	Last ip	BID
172.168.0.0	172.168.0.1 . . . . .	172.168.0. <del>255</del> <sup>257</sup> .254	172.168.127.0.255
172.168.128.0	172.168.128.1 . . . . .	172.168.255.254	172.168.255.255

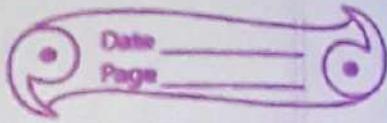
2-2 172.168.0.0 118

a) New subnet mask

$$\Rightarrow 255.255.11000000.00000000$$

$$\Rightarrow 255.255.192.0$$

$$\begin{aligned}
 b) \text{ No. of network} &= 2^8 \\
 &= 2^2 \\
 &= 4
 \end{aligned}$$



c) no. of host per network =  $2^4 - 2$   
 $= 2^{14} - 2$

~~16384~~ 16382

d) jumping value

$\Rightarrow 256 - 192$

$\Rightarrow 64$

e) Subnetting table

Network id	1st ip	Last ip	Broadcast
172.168.0.0	0.1	- - -	63.254
172.168.64.0	64.1	- - -	127.254
172.168.128.0	128.1	- - -	191.254
172.168.192.0	192.1	- - -	255.254

3.) 172.168.0.0 /19

a.) New subnet mask

$$\Rightarrow 255.255.\cancel{1}1100000.00000000$$

$$\Rightarrow 255.255.224.0$$

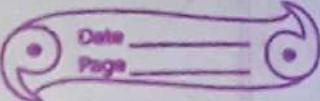
b.) No of network =  $2^N$   
=  $2^3$   
= 8

c.) No. of valid Host per network =  $2^{H-2}$   
=  $2^{13-2}$   
= 8190.

d.) ~~Range~~ Jumping value

$$\Rightarrow 256 - 224$$

$$\Rightarrow 32$$



### (c) Subnetting table

Nid	1st ip	....	Last ip	BId
172.168.0.0	0.1	- - -	31.254	172.168.31.255
172.168.32.0	32.1	- - -	63.254	172.168.63.255
172.168.64.0	64.1	- - -	95.254	172.168.95.255
172.168.96.0	96.1	- - -	127.254	172.168.127.255
172.168.128.0	128.1	- - -	159.254	172.168.159.255
172.168.160.0	160.1	- - -	191.254	172.168.191.255
172.168.192.0	192.1	- - -	223.254	172.168.223.255
172.168.224.0	224.1	- - -	255.254	172.168.255.255

4) 172.168.0.0 (20)

a) New subnet mask

$$\Rightarrow 255 \cdot 255 \cdot 11110000 \cdot 00000000$$

$$\Rightarrow 255 \cdot 255 \cdot 240 \cdot 0$$

b) No. of network =  $2^n$

$$= 2^4$$

$$= 16$$



c.) no. of Host per network =  $2^H - 2$   
 $= 2^{12} - 2$   
 $= 4094$

d.) jumping value

$$\Rightarrow 256 - 240$$

$$\Rightarrow 16$$

e.) subnetting table

Net	1st ip	Last ip	Brd
172.168.0.0	0.1	15.254	15.255
172.168.16.0	16.1	31.254	31.255
172.168.32.0	32.1	47.254	47.255
172.168.48.0	48.1	63.254	63.255
64.0	64.1	79.254	79.255
80.0	80.1	95.254	95.255
:	:	:	:
			159.255
160.0	160.1	175.254	175.255
176.0	176.1	191.254	191.255
192.0	192.1	207.254	207.255
208.0	208.1	223.254	223.255
224.0	224.1	239.254	239.255
240.0	240.1	255.254	255.255

5) 172.168.0.0 121

a.) New Subnet Mask

$$\Rightarrow 255.255.\underline{1111000}.0000000$$

$$\Rightarrow 255.255.248.0$$

b.) No of Network  $\approx 2^7$   
 $\approx 2^5$   
 $\approx 32$

c.) No. of Host per network  $= 2^4 - 2$   
 $= 2^{11} - 2$   
 $= 2046$

d.) Jumping Value

$$\Rightarrow 256 - 248$$

$$\Rightarrow 8$$

## e) Subnetting table

Nid	1st ip	last ip	Bid
172.168.0.0	0.1	~ ~ ~ ~ 7.254	7-255
172.168.0.8.0	8.1	~ ~ ~ ~ 15.254	15-255
172.168.0.46.0	46.1	~ ~ ~ ~ 23.254	23-255
24.0	24.1	~ ~ ~ ~ 31.254	31-255
!	!	~ ~ ~ ~	!
!	!	~ ~ ~ ~ 223.254	223-255
224.0	224.1	~ ~ ~ ~ 231.254	221-255
232.0	232.1	~ ~ ~ ~ 239.254	239-255
240.0	240.1	~ ~ ~ ~ 247.254	247-255
248.0	248.1	~ ~ ~ ~ 255.254	255-255

6) 172.168.0.0 /22

a) New subnet mask

 $\Rightarrow 255.255.11111100.00000000$  $\Rightarrow 255.255.252.0$ 

b) No of network ~~possible~~ =  $2^n$   
 $= 2^6$   
 $= 64$

c) no. of host per network =  $2^H - 2$   
 = ~~2<sup>10</sup>~~  $2^{10} - 2$   
 = ~~1024~~ 1022

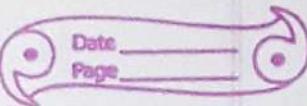
d) jumping value

$$\Rightarrow 256 - 252$$

$$\Rightarrow 4$$

e) subnetting table

Nid	1st ip	last ip	Bid
172.168.0.0	0.1	3.254	30.255
172.168.4.0	4.1	7.254	7.255
172.168.8.0	8.1	11.254	11.255
172.168.12.0	12.1	15.254	15.255
16.0	16.1	19.254	15.255
20.0	20.1	23.254	23.255
24.0	24.1	27.254	27.255
:	:	:	:
236.0	236.1	239.254	239.255
240.0	240.1	243.254	243.255
244.0	244.1	247.254	247.255
248.0	248.1	251.254	247.255
252.0	252.1	255.254	251.255



7) 172.168.0.0 123

a) New subnet mask

$$\Rightarrow 255.255.11111110.00000000$$

$$\Rightarrow 255.255.254.0$$

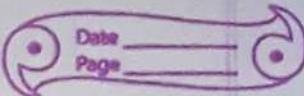
$$\begin{aligned} b) \text{ no. of network} &= 2^7 \\ &= 2^7 \\ &= 128 \end{aligned}$$

$$\begin{aligned} c) \text{ no. of } \overset{\text{valid}}{\wedge} \text{ Hosts per network} &= 2^9 - 2 \\ &= 2^9 - 2 \\ &= 510 \end{aligned}$$

d) Jumping value

$$\Rightarrow 256 - 254$$

$$\Rightarrow 2$$



### e) Subnetting Table

Nid	1st ip	last ip	Bid
172.168.0.0	172.168.0.1	172.168.1.254	172.168.0.255
172.168.0.2.0	2.1	3.254	3.255
172.168.0.4.0	4.1	5.254	5.255
6.0	6.1	7.254	7.255
8.0	8.1	9.254	9.255
10.0	10.1	11.254	11.255
:			:
172.168.246.0	246.1	247.254	247.255
248.0	248.1	249.254	249.255
250.0	250.1	251.254	251.255
252.0	252.1	253.254	253.255
254.0	254.1	255.254	255.255

8) 172.168.0.0 124

a) New subnet mask

$\Rightarrow 255.255.1111111.00000000$

$\Rightarrow 255.255.255.0$

b) No. of networks =  $2^n$

$$= 2^8$$

$$= 256$$

c.) No. of Host per network =  $2^H - 2$

$$= 2^8 - 2$$

$$= 256 - 2$$

$$= 254$$

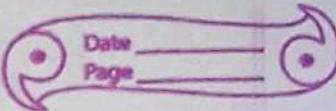
d.) Jumping value :

$$\Rightarrow 256 - 255$$

$$\Rightarrow 1$$

e.) Subnetting Table

Nid	1st ip	last ip	Bid
172.168.0.0	0.1	0.254	172.168.0.255
172.168.1.0	1.1	1.254	1.255
2.0	2.1	2.254	2.255
3.0	3.1	3.254	3.255
4.0	4.1	4.254	4.255
5.0	5.1	5.254	5.255
6.0	6.1	6.254	6.255
:	:	:	:
172.168.252.0	252.1	252.254	252.255
253.0	253.1	253.254	253.255
254.0	254.1	254.254	254.255
255.0	255.1	255.254	255.255



g.) 172.168.0.0 /25

a) New subnet mask

$\Rightarrow 255.255.\underline{\quad} 11111111.10000000$

$\Rightarrow 255.255.255.128$

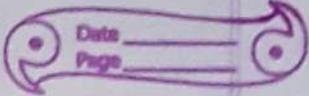
$$\begin{aligned} b) \text{ no. of network} &= 2^7 \\ &= 2^9 \\ &= 512 \end{aligned}$$

$$\begin{aligned} c) \text{ no. of valid Host per network} &= 2^H - 2 \\ &= 2^7 - 2 \\ &= 128 - 2 \\ &= 126 \end{aligned}$$

d.) Jumping value

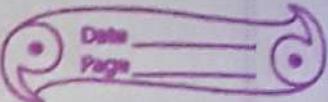
$\Rightarrow 256 - 128$

$\Rightarrow 128$



e.) subnetting table

Nid	1st ip	last ip	Sub
172.168.0.0	0.1	0.126	172.168.0.127
172.168.0.128	0.129	0.254	172.168.0.255
172.168.1.0	1.1	1.126	172.168.1.127
172.168.1.128	1.129	1.254	172.168.1.255
172.168.2.0	2.1	2.126	172.168.2.127
172.168.2.128	2.129	2.254	172.168.2.255
172.168.3.0	3.1	3.126	172.168.3.127
172.168.3.128	3.129	3.254	172.168.3.255
172.168.4.0	4.1	4.126	172.168.4.127
172.168.4.128	4.129	4.254	172.168.4.255
172.168.5.0	5.1	5.126	172.168.5.127
⋮	⋮	⋮	⋮
⋮	⋮	⋮	⋮
⋮	⋮	⋮	172.168.251.127
172.168.251.0	251.1	251.254	172.168.251.255
172.168.252.0	252.1	252.126	172.168.252.127
172.168.252.128	252.129	252.254	172.168.252.255
172.168.253.0	253.1	253.126	172.168.253.127
172.168.253.128	253.129	253.254	172.168.253.255
172.168.254.0	254.1	254.126	172.168.254.127
172.168.254.128	254.129	254.254	172.168.254.255
172.168.255.0	255.1	255.126	172.168.255.127
172.168.255.128	255.129	255.254	172.168.255.255



In) 172.168.0.0 /26

a) New subnet mask

$$\Rightarrow 255.255.\underbrace{1111111}_{\text{Network}}.\underbrace{11000000}_{\text{Host}}$$

$$\Rightarrow 255.255.255.192$$

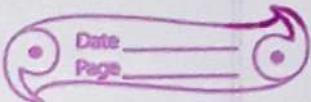
b) no. of ~~valid host per network~~  $2^n$   
 $= 2^{10}$   
 $= 1024$

c) no. of ~~host~~ valid host per network =  $2^6 - 2$   
 $= 2^6 - 2$   
 $= 62$

d) Jumping value

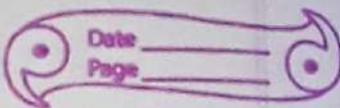
$$\Rightarrow 256 - 492$$

$$\Rightarrow 64$$



### c) Subnetting table

Nid	1st ip	Last ip	Bid
172.168.0.0	0.1	0.62	172.168.0.63
172.168.0.64	0.65	0.126	0.127
172.168.0.128	0.129	0.190	0.191
0.192	0.193	0.254	0.255
1.0	1.1	1.62	1.63
1.64	1.65	1.126	1.127
1.128	1.129	1.190	1.191
1.192	1.193	1.254	1.255
2.0	2.1	2.62	2.63
2.64	2.65	2.126	2.127
2.128	2.129	2.190	2.191
2.192	2.193	2.254	2.255
3.0	3.1	3.62	3.63
3.64	3.65	3.126	3.127
3.128	3.129	3.190	3.191
3.192	3.193	3.254	3.255
4.0	4.1	4.62	4.63
4.64	4.65	4.126	4.127
4.128	4.129	4.190	4.191
4.192	4.193	4.254	4.255
5.0	5.1	5.62	5.63
5.64	5.65	5.126	5.127
5.128	5.129	5.190	5.191
5.192	5.193	5.254	5.255
6.0	6.1	6.62	6.63
6.64	6.65	6.126	6.127
6.128	6.129	6.190	6.191
6.192	6.193	6.254	6.255



ii) 192.168.0.0 /27

a) new subnet mask

$$\Rightarrow 255.255.\underline{11111111}.\underline{11100000}$$

$$\Rightarrow 255.255.255.224$$

b) no. of network =  $2^7$

$$= 2^7$$

$$= 128$$

c) no. of valid host per network =  $2^{7-2}$

$$= 2^5 - 2$$

$$= 32 - 2$$

$$= 30$$

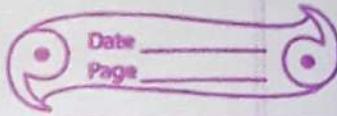
d) Jumping value

$$\Rightarrow 256 - 224$$

$$\Rightarrow 32$$

## e) subnetting table

Nid	1st ip		last ip	Bid
172.168.0.0	0.1	- - - .	0.30	172.168.0.31
172.168.0.32	0.33	- - - .	0.62	0.63
172.168.0.64	0.65	- - - .	0.94	0.95
0.96	0.97	- - - .	0.126	0.127
0.128	0.129	- - - .	0.158	0.159
0.160	0.161	- - - .	0.190	0.191
0.192	0.193	- - - .	0.222	0.223
0.224	0.225	- - - .	0.254	0.255
0.256	0.257	- - - .	1.30	1.31
1.32	1.33	- - - .	1.62	1.63
1.64	1.65	- - - .	1.94	1.95
1.96	1.97	- - - .	1.126	1.127
1.128	1.129	- - - .	1.158	1.159
1.160	1.161	- - - .	1.190	1.191
:	:		:	
:	:		:	
255.32	255.33	- - - .	255.62	255.63
255.64	255.65	- - - .	255.94	255.95
255.96	255.97	- - - .	255.126	255.127
255.128	255.129	- - - .	255.158	255.159
255.160	255.161	- - - .	255.190	255.191
255.192	255.193	- - - .	255.222	255.223
172.168.255.224	255.225	- - - .	255.254	172.168.255.255



12) ~~255.255.1111111.11110000~~ 172.168.0.0 128

a.) new subnet mask

$$\Rightarrow 255.255.1111111.11110000$$

$$\Rightarrow 255.255.\cancel{255}.240$$

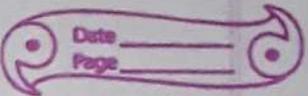
$$\begin{aligned} b.) \text{ no. of network} &= 2^n \\ &= 2^{12} \\ &= 4096 \end{aligned}$$

$$\begin{aligned} c.) \text{ no. of valid Host per network} &= 2^4 - 2 \\ &= 2^4 - 2 \\ &= 16 - 2 \\ &= 14 \end{aligned}$$

d.) Jumbo value:

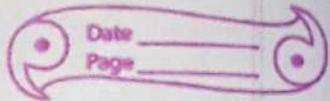
$$\Rightarrow 256 - 240$$

$$\Rightarrow 16$$



## 6) Subnetting Table

Nid				Bid
172.168.0.0	0.1	- - - -	0.14	172.168.0.15
172.168.0.16	0.17	- - - -	0.30	0.31
172.168.0.32	0.31	- - - -	0.46	0.47
1 0.48	0.49	- - - -	0.62	0.63
0.64	0.65	- - - -	0.78	0.79
0.80	0.81	- - - -	0.94	0.95
0.96	0.97	- - - -	0.110	0.111
0.112	0.113	- - - -	0.126	0.127
0.128	0.129	- - - -	0.142	0.143
0.144	0.145	- - - -	0.158	0.159
0.160	0.161	- - - -	0.174	0.175
0.176	0.177	- - - -	0.190	0.191
0.192	0.193	- - - -	0.208	0.207
0.208	0.209	- - - -	0.222	0.223
0.224	0.225	- - - -	0.238	0.239
0.240	0.241	- - - -	0.254	0.255
1.0	1.1	- - - -	01.14	1.15
;	:	:	:	;
<del>255</del>	255.191			
253.192	253.193	- - - -	253.206	253.207
253.208	253.209	- - - -	253.222	253.223
253.224	253.225	- - - -	253.238	253.239
172.168.253.240	253.241	- - - -	253.254	172.168.253.255



Q3.) 172.168.0.0 /29

a) New subnet mask

$$\Rightarrow 255.255.1111111.1111000$$

$$\Rightarrow 255.255.255.248$$

b) no. of networks =  $2^n$

$$= 2^{13}$$

$$= 8192$$

c) no. of valid hosts per network =  $2^k - 2$

$$= 8 - 2$$

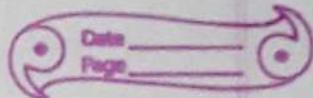
$$= 6$$

d) ~~one~~ jumping value

$$\Rightarrow 256 - 248$$

$$\Rightarrow 8$$

e) Subnetting table



Nid	1st ip	last ip	Bid
172.168.0.0	0.1	0.6	0.7
172.168.0.8	0.9	0.14	0.15
0.16	0.17	0.22	0.23
0.24	0.25	0.30	0.31
0.32	0.33	0.38	0.39
0.40	0.401	0.46	0.47
0.48	0.49	0.54	0.55
0.56	0.57	0.62	0.63
0.64	0.65	0.70	0.71
0.72	0.73	0.78	0.79
0.80	0.81	0.86	0.87
0.88	0.89	0.94	0.95
0.96	0.97	0.102	0.103
0.104	0.105	0.110	0.111
:	:	:	:
:	:	:	:
255.184	255.185	255.190	255.191
255.192	255.193	255.198	255.2199
255.200	255.201	255.206	255.207
255.208	255.209	255.214	255.215
255.216	255.217	255.222	255.223
255.224	255.225	255.230	255.231
255.232	255.233	255.238	255.239
255.240	255.241	255.249	255.247
255.248	255.249	255.254	172.168.255

Q4.) 172.168.0.0 /30

a) New subnet mask

$$\Rightarrow 255 \cdot 255 \cdot 11111111 \cdot 11111100$$

$$\Rightarrow 255 \cdot 255 \cdot 255 \cdot 252$$

$$\begin{aligned} b) \text{ no. of networks} &= 2^7 \\ &= 2^{14} \\ &= 16384 \end{aligned}$$

$$\begin{aligned} c) \text{ no. of Valid Hosts per network} &= 2^3 - 2 \\ &= 2^2 - 2 \\ &= 4 - 2 \\ &= 2 \end{aligned}$$

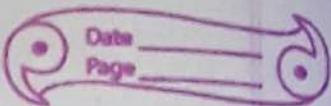
d) Jumping value

$$\Rightarrow 256 - 252$$

$$\Rightarrow 4$$

e) Subnetting table

Nid	1st ip	last ip	Bid
172.168.0.0	0.1	0.2	172.168.0.3
0.4	0.5	0.6	0.7
0.8	0.9	0.10	0.11
0.12	0.13	0.14	0.15
0.16	0.17	0.18	0.19
0.20	0.21	0.22	0.23
0.24	0.25	0.26	0.27
0.28	0.29	0.30	0.31
0.32	0.33	0.34	0.35
0.36	0.37	0.38	0.39
0.40	0.41	0.42	0.43
0.44	0.45	0.46	0.47
0.48	0.49	0.50	0.51
0.52	0.53	0.54	0.55
0.56	0.57	0.58	0.59
0.60	0.61	0.62	0.63
:	:	:	255.228
:	:	:	255.231
:	:	:	255.235
255.228	255.229	255.230	255.231
255.232	255.233	255.234	255.235
255.236	255.237	255.238	255.239
255.240	255.241	255.242	255.243
255.244	255.245	255.248	255.247
255.248	255.249	255.250	255.251
172.168.255.252	255.253	255.254	172.168.255.255



Q) 172.168.0.0 / 31

a) New subnetmask

$\Rightarrow 255.255.1111111.1111110$

$\Rightarrow 255.255.255.254$

$$\begin{aligned} b) \text{ No. of networks} &= 2^7 \\ &= 2^{15} \\ &= 32768 \end{aligned}$$

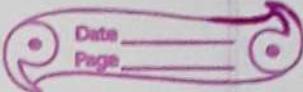
$$\begin{aligned} c) \text{ No. of Valid Hosts per network} &= 2^4 - 2 \\ &= 2^4 - 2 \\ &= 0 \end{aligned}$$

d) Sumping value

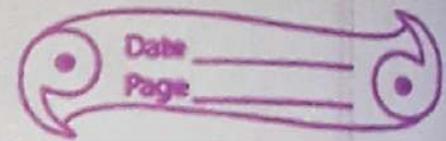
$\Rightarrow 256 - 254$

$\Rightarrow 2$

e) Subnetting table



Nid	1st ip	last ip	Bid
172.168.0.0			0.1
172.168.0.2			0.3
0.04			0.5
0.06			0.7
0.08			0.9
0.010			0.11
0.12			0.13
0.14			0.15
0.16			0.17
0.18			0.19
0.20			0.21
0.22			0.23
0.24			0.25
:			:
255.236			255.237
255.238			255.239
255.240			255.241
255.242			255.243
255.244			255.245
255.246			255.247
255.248			255.249
255.250			255.251
255.252			255.253
172.168.253, 254			172.168.255, 255



16) 172.168.0.0 /32

a) New subnet mask

$\Rightarrow 255.255.\underbrace{11111111}_{\text{Network ID}}.\underbrace{11111111}_{\text{Host ID}}$

$\Rightarrow 255.255.255.255$

$$\begin{aligned} b) \text{ No. of Network} &= 2^7 \\ &= 2^{16} \\ &= 65536 \end{aligned}$$

$$\begin{aligned} c) \text{ No. of valid Host per network} &= 2^4 - 2 \\ &= 2^0 - 2 \\ &= -1 \end{aligned}$$

Class - A

1) 10.0.0.0 /9

a) New Subnetmask

$$\Rightarrow 255.10000000.00000000.00000000$$

$$\Rightarrow 255.128.0.0$$

$$\begin{aligned} b) \text{ No. of network} &= 2^7 \\ &= 2^1 \\ &= 2 \end{aligned}$$

$$\begin{aligned} c) \text{ No. of valid hosts per network} &= 2^4 - 2 \\ &= 2^{23} - 2 \\ &= 8388606 \end{aligned}$$

d) Jumping Value

$$\Rightarrow 256 - 128$$

$$\Rightarrow 128$$

e) Subnetting table



Nid	1st ip	last ip	Bid
10.0.0.0	10.0.0.1	10.127.255.254	10.127.255.255
10.128.0.0	10.128.0.1	10.255.255.254	10.255.255.255

2) 10.0.0.0 (10)

a) new subnet mask

$$\Rightarrow 255.11000000.00000000.00000000$$

$$\Rightarrow \text{255.192.0.0}$$

$$\begin{aligned} b) \text{ no. of network} &= 2^n \\ &= 2^2 \\ &= 4 \end{aligned}$$

$$\begin{aligned} c) \text{ no. of valid hosts per network} &= 2^H - 2 \\ &= 2^{2^2} - 2 \\ &= 4194302 \end{aligned}$$

d) jumping value

$$\Rightarrow 256 - 192$$

$$\Rightarrow 64$$

## Q) Subnetting table

Net ID	1st IP	Last IP	Broadcast IP
10.0.0.0	10.0.0.1	10.63.255.254	10.63.255.255
10.64.0.0	10.64.0.1	10.127.255.254	10.127.255.255
10.128.0.0	10.128.0.1	10.191.255.254	10.191.255.255
10.192.0.0	10.192.0.1	10.255.255.254	10.255.255.255

Q) 10.0.0.0 /11

a) New subnet mask

$$\Rightarrow 253 \cdot 11100000 \cdot 00000000 \cdot 00000000$$

~~$\Rightarrow 255 \cdot 11100000 \cdot 00000000 \cdot 224 \cdot 0 \cdot 0$~~

$$\Rightarrow 255 \cdot 224 \cdot 0 \cdot 0$$

b) No. of networks =  $2^3$   
 $= 2^3$   
 $= 8$

c) No. of valid hosts per network =  $2^4 - 2$   
 $= 2^4 - 2$   
 $= 2097150$

a) Jumping value

$$\Rightarrow 256 - 224$$

$$\Rightarrow 32$$

..

b) Subnetting table

Net ID	1 <sup>st</sup> IP	last IP	BID
10.0.0.0	10.0.0.1	- - - . 10.31.255.254	10.0.31.255.255
10. <del>32</del> 32.0.0	10.32.0.1	- - - . 10.63.255.254	10.63.255.255
10. 64.0.0	10.64.0.1	- - - . 10.95.255.254	10.95.255.255
10. 96.0.0	10.96.0.1	- - - . 10.127.255.254	10.127.255.255
10. 128.0.0	10.128.0.1	- - - . 10.159.255.254	10.159.255.255
10. 160.0.0	10.160.0.1	- - - . 10.191.255.254	10.191.255.255
10. 192.0.0	10.192.0.1	- - - . 10.223.255.254	10.223.255.255
10. <del>224</del> 224.0.0	10.224.0.1	- - - . 10.255.255.254	10.255.255.255

4) 10.0.0.0 / ~~12~~ 11

a) New subnet mask

$\Rightarrow$  ~~255.~~ 255.11110000.00000000.00000000

$\Rightarrow$  255.240.0.0

$$\text{b) No. of network} = 2^n$$

$$= 2^4$$

$$= 16$$

$$\text{c.) no. of valid hosts per network} = 2^H - 2 \\ = 2^{20} - 2 \\ = 1048574$$

d) Jumping value

$$\Rightarrow 256 - 240$$

⇒ 16

### e) Subnetting table

Mid	1st ip	last ip	Did
10.0.0.0	10.10.0.1	10.15.255.254	10.15.255.255
10.16.0.0	10.16.0.1	10.31.255.254	10.31.255.255
10.32.0.0	10.32.0.1	10.47.255.254	10.47.255.255
10.48.0.0	10.48.0.1	10.63.255.254	10.63.255.255
10.64.0.0	10.64.0.1	10.79.255.254	10.79.255.255
10.80.0.0	10.80.0.1	10.95.255.254	10.95.255.255
10.96.0.0	10.96.0.1	10.111.255.254	10.111.255.255
10.112.0.0	10.112.0.1	10.127.255.254	10.127.255.255
10.128.0.0	10.128.0.1	10.143.255.254	10.143.255.255
10.144.0.0	10.144.0.1	10.159.255.254	10.159.255.255

10.160.0.0	10.160.0.1 - - - 10.175.255.254	10.175.255.205
10.176.0.0	10.176.0.1 - - - 10.191.255.254	10.181.255.285
10.192.0.0	10.192.0.1 - - - 10.207.255.254	10.207.255.255
10.208.0.0	10.208.0.1 - - - 10.223.255.254	10.223.255.285
10.224.0.0	10.224.0.1 - - - 10.239.255.254	10.239.255.285
10.240.0.0	10.240.0.1 - - - 10.255.255.254	10.255.255.255

5) 10.0.0.0 (13)

a) new subnetmask

$$\Rightarrow 255.1111000.0000000.0000000$$

$$\Rightarrow 255.\cancel{000000}248.0.0$$

$$\begin{aligned} b) \text{ No. of networks} &= 2^n \\ &= 2^5 \\ &= 32 \end{aligned}$$

$$\begin{aligned} c) \text{ No. of valid hosts per network} &= 2^H - 2 \\ &= 2^{19} - 2 \\ &= 524286 \end{aligned}$$

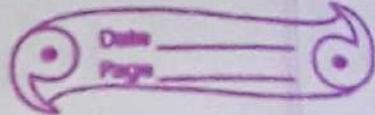
d) summing value

$$\Rightarrow 256 - \cancel{256}248$$

$$\Rightarrow 48$$

## Q) Subnetting table

Nid	1st ip	last ip	gid
10.0.0.0	10.0.0.1	10.7.255.254	10.7.255.2545
10.8.0.0	10.8.0.1	10.15.255.254	10.15.255.2545
10. <del>16.0.0</del> 16.0.0	10.16.0.1	10.23.255.254	10.23.255.2545
10. <del>24.0.0</del> 24.0.0	10.24.0.1	10.31.255.254	10.31.255.2545
10. <del>32.0.0</del> 32.0.0	10.32.0.1	10.39.255.254	10.39.255.2545
10. <del>40.0.0</del> 40.0.0	10.40.0.1	10.47.255.254	10.47.255.2545
10. <del>48.0.0</del> 48.0.0	10.48.0.1	10.55.255.254	10.55.255.2545
10.56.0.0	10.56.0.1	10.63.255.254	10.63.255.2545
10.64.0.0	10.64.0.1	10.71.255.254	10.71.255.2545
10.72.0.0	10.72.0.1	10.79.255.254	10.79.255.2545
10.80.0.0	10.80.0.1	10.87.255.254	10.87.255.2545
10.1076.0.0	10.176.0.1	10.183.255.254	10.183.255.2545
10.184.0.0	10.184.0.1	10.191.255.254	10.191.255.2545
10.192.0.0	10.192.0.1	10.199.255.254	10.199.255.2545
10.200.0.0	10.200.0.1	10.207.255.254	10.207.255.2545
10.208.0.0	10.208.0.1	10.215.255.254	10.215.255.2545
10.216.0.0	10.216.0.1	10.223.255.254	10.223.255.2545
10.224.0.0	10.224.0.1	10.231.255.254	10.231.255.2545
10.232.0.0	10.232.0.1	10.239.255.254	10.239.255.2545
10.240.0.0	10.240.0.1	10.247.255.254	10.247.255.2545
10.248.0.0	10.248.0.1	10.255.255.254	10.255.255.2545



6.) 10.0.0.0 /14

a.) New subnet mask

$\Rightarrow 255.11111100.00000000.00000000$

$\Rightarrow 255.252.0.0$

$$\begin{aligned} b.) \text{No. of network} &= 2^n \\ &= 2^6 \\ &= 64 \end{aligned}$$

$$\begin{aligned} c.) \text{No. of valid Hosts per network} &= 2^m - 2 \\ &= 2^{18} - 2 \\ &= 262142 \end{aligned}$$

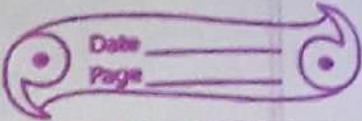
d.) Jumping value

$\Rightarrow 256 - 252$

$\Rightarrow 4$

e.) Subnetting table

Nid	1 <sup>st</sup> ip . . . . .	last ip	Bid
10.0.0.0	10.0.0.1 . . . . .	10.3.255.254	10.3.255.255
10.4.0.0	10.4.0.0.1 . . . . .	10.7.255.254	10.7.255.255
10.8.0.0	10.8.0.0.1 . . . . .	10.11.255.254	10.11.255.255
10.12.0.0	10.12.0.1 . . . . .	10.15.255.254	10.15.255.255
10.16.0.0	10.16.0.1 . . . . .	10.19.255.254	10.19.255.255
10.20.0.0	10.20.0.1 . . . . .	10.23.255.254	10.23.255.255
10.24.0.0	10.24.0.1 . . . . .	10.27.255.254	10.27.255.255
10.28.0.0	10.28.0.1 . . . . .	10.31.255.254	10.31.255.255
10.32.0.0	10.32.0.1 . . . . .	10.35.255.254	10.35.255.255
10.36.0.0	10.36.0.1 . . . . .	10.39.255.254	10.39.255.255
10.40.0.0	10.40.0.1 . . . . .	10.43.255.254	10.43.255.255
10.44.0.0	10.44.0.1 . . . . .	10.47.255.254	10.47.255.255
10.48.0.0	10.48.0.1 . . . . .	10.51.255.254	10.51.255.255
:	:	:	:
10.218.0.0	10.216.0.1 . . . . .	10.219.255.254	10.219.255.255
10.220.0.0	10.220.0.1 . . . . .	10.222.255.254	10.223.255.255
10.224.0.0	10.224.0.1 . . . . .	10.227.255.254	10.227.255.255
10.228.0.0	10.228.0.1 . . . . .	10.231.255.254	10.231.255.255
10.232.0.0	10.232.0.1 . . . . .	10.235.255.254	10.235.255.255
10.236.0.0	10.236.0.1 . . . . .	10.239.255.254	10.239.255.255
10.240.0.0	10.240.0.1 . . . . .	10.243.255.254	10.243.255.255
10.244.0.0	10.244.0.1 . . . . .	10.247.255.254	10.247.255.255
10.248.0.0	10.248.0.1 . . . . .	10.251.255.254	10.251.255.255
10.252.0.0	10.252.0.1 . . . . .	10.255.255.254	10.255.255.255



7) 10.0.0.0 /15

a) New subnetmask

$$\Rightarrow 255.11111110.00000000.00000000$$

$$\Rightarrow 255.254.0.0$$

$$b) \text{ No. of networks} = 2^7$$

$$= 2^7$$

$$= 128$$

$$c) \text{ No. of valid hosts per networks} = 2^H - 2$$

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

$$= 16384 - 2$$

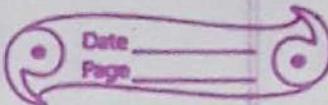
$$= 16382$$

d) Jumping value

$$\Rightarrow 256 - 254$$

$$\Rightarrow 2$$

e) Subnetting table



Nid	1st IP	last IP	Bid
10.0.0.0	10.0.0.1 - . . .	10.1.255.254	10.1.255.255
10.1.0.0	10.1.0.1 - - - -	10.3.255.254	10.3.255.255
10.4.0.0	10.4.0.1 - - - -	10.5.255.254	10.5.255.255
10.6.0.0	10.6.0.1 - - - -	10.7.255.254	10.7.255.255
10.8.0.0	10.8.0.1 - - - -	10.9.255.254	10.9.255.255
10.10.0.0	10.10.0.1 - - - -	10.11.255.254	10.11.255.255
10.12.0.0	10.12.0.1 - - - -	10.13.255.254	10.13.255.255
10.14.0.0	10.14.0.1 - - - -	10.15.255.254	10.15.255.255
:	:		:
10.244.0.0	10.244.0.1 - - - -	10.245.255.254	10.245.255.255
10.246.0.0	10.246.0.1 - - - -	10.247.255.254	10.247.255.255
10.248.0.0	10.248.0.1 - - - -	10.249.255.254	10.249.255.255
10.250.0.0	10.250.0.1 - - - -	10.251.255.254	10.251.255.255
10.252.0.0	10.252.0.1 - - - -	10.253.255.254	10.253.255.255
10.254.0.0	10.254.0.1 - - - -	10.255.255.254	10.255.255.255

8.1 10.0.0.0 /16

a) new subnet mask

$\Rightarrow$  255.1111111.00000000.00000000

$\Rightarrow$  255.255.0.0

b) no. of network =  $2^7$   
 $= 2^8$   
 $= 256$

c) no. of ~~host~~ valid hosts per ~~host~~ network =  $2^4 - 2$   
 $= 2^6 - 2$   
 $= 65534$

d) Summing value

$\rightarrow 256 - 255$

$\rightarrow 1$

e) Subnetting table

Nid	1 <sup>st</sup> ip	last ip	Bid
10.0.0.0	10.0.0.1	10.0.255.254	10.0.255.255
10.1.0.0	10.1.0.1	10.1.255.254	10.1.255.255
10.2.0.0	10.2.0.1	10.2.255.254	10.2.255.255
10.3.0.0	10.3.0.1	10.3.255.254	10.3.255.255
10.4.0.0	10.4.0.1	10.4.255.254	10.4.255.255
:	:	:	:
10.253.0.0	10.253.0.1	10.253.255.254	10.253.255.255
10.254.0.0	10.254.0.1	10.254.255.254	10.254.255.255
10.255.0.0	10.255.0.1	10.255.255.254	10.255.255.255

8) 10.0.0.0 /~~16~~ 17

a) New subnetmask

$\Rightarrow 255.\cancel{1}111111.1000000.00000000$

$\Rightarrow 255.255.128.0$

$$\begin{aligned} b) \text{ No. of networks} &= 2^n \\ &\stackrel{?}{=} 2 \\ &= 512 \end{aligned}$$

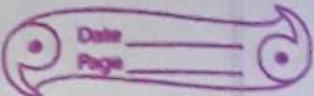
$$\begin{aligned} c) \text{ No. of valid hosts per network} &= 2^H - 2 \\ &= \cancel{32} 2^{15} - 2 \\ &= 32766 \end{aligned}$$

d) ~~Mask~~ Jumping value

$\Rightarrow 256 - 128$

$\Rightarrow 128$

e) Subnetting table



Nid	1 <sup>st</sup> ip	last ip	Bid
10.0.0.0	10.0.0.1	10.0.127.254	10.0.127.255
10.0.128.0	10.0.128.1	10.0.255.254	10.0.255.255
10.1.0.0	10.1.0.1	10.1.127.254	10.1.127.255
10.1.128.0	10.1.128.1	10.1.255.254	10.1.255.255
10.2.0.0	10.2.0.1	10.2.127.254	10.2.127.255
10.2.128.0	10.2.128.1	10.2.255.254	10.2.255.255
10.3.0.0	10.3.0.1	10.3.127.254	10.3.127.255
10.253.0.0	10.253.0.1	10.253.127.254	10.253.127.255
10.253.128.0	10.253.128.1	10.253.255.254	10.253.255.255
10.254.0.0	10.254.0.1	10.254.127.254	10.254.127.255
10.254.128.0	10.254.128.1	10.254.255.254	10.254.255.255
10.255.0.0	10.255.0.1	10.255.127.254	10.255.127.255
10.255.128.0	10.255.128.1	10.255.255.254	10.255.255.255

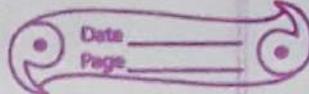
Q) 10.0.0.0 118

a.) New subnet mask

⇒ 255.1111111.11000000.000000

⇒ 255.255.192.0

b.) No. of Networks =  $2^n$   
 $= 2^{10}$   
 $= 1024$



c) no. of valid hosts per network =  $2^H - 2 = 2^4 - 2$   
 $= 16382$

d) Jumping value

$$\Rightarrow 256 - 192$$

$$\Rightarrow 64$$

e) Subnetting ~~table~~ table

Nid	1st ip	last ip	Bid
10.0.0.0	10.0.0.1	10.0.63.254	10.0.63.255
10.0.64.0	10.0.64.1	10.0.127.254	10.0.127.255
10.0.128.0	10.0.128.1	10.0.191.254	10.0.191.255
10.0.192.0	10.0.192.1	10.0.255.254	10.0.255.255
10. <del>0.0.</del> 1.0.0	10.1.0.1	10.1.63.254	10.1.63.255
10.1.64.0	10.1.64.1	10.1.127.254	10.1.127.255
10.1.128.0	10.1.128.1	10.1.191.254	10.1.191.255
10.1.192.0	10.1.192.1	10.1.255.254	10.1.255.255
10.2.0.0	10.2.0.1	10.2.63.254	10.2.63.255
10.255.0.0	10.255.0.1	10.255.63.254	10.255.63.255
10.255.64.0	10.255.64.1	10.255.127.254	10.255.127.255
10.255.128.0	10.255.128.1	10.255.191.254	10.255.191.255
10.255.192.0	10.255.192.1	10.255.255.254	10.255.255.255

10) 10.0.0.0 /19

a) New subnet mask

$$\Rightarrow 255.1111111.11100000.00000000$$

$$\Rightarrow 255.255.224.0$$

b) no. of networks =  $2^n$

$$= 2^{11}$$

$$= 2048$$

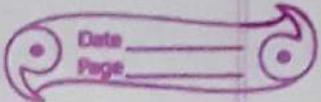
c) no. of valid hosts per network =  $2^H - 2$   
 $= 2^{13} - 2$   
 $= 8192$

d) ~~Mask~~ Jumping value

$$\Rightarrow 256 - 224$$

$$\Rightarrow 32$$

e) Subnetting table



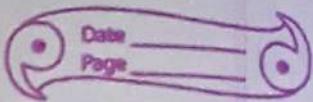
Nid	1 <sup>st</sup> ip	Last ip	Bid
10.0.0.0	10.0.0.1 - - -	10.0.31.254	10.0.31.255
10.0.32.0	10.0.32.1 - - -	10.0.63.254	10.0.63.255
10.0.64.0	10.0.64.1 - - -	10.0.95.254	10.0.95.255
10.0.96.0	10.0.96.1 - - -	10.0.127.254	10.0.127.255
10.0.128.0	10.0.128.1 - - -	10.0.159.254	10.0.159.255
10.0.160.0	10.0.160.1 - - -	10.0.191.254	10.0.191.255
10.0.192.0	10.0.192.1 - - -	10.0.223.254	10.0.223.255
10.0.224.0	10.0.224.1 - - -	10.0.255.254	10.0.255.255
10.1.0.0	10.1.0.1 - - -	10.1.31.254	10.1.31.255
!	!	!	!
!	!	!	!
!	!	!	!
10.255.128.0	10.255.128.1 - - -	10.255.159.254	10.255.159.255
10.255.160.0	10.255.160.1 - - -	10.255.191.254	10.255.191.255
10.255.192.0	10.255.192.1 - - -	10.255.223.254	10.255.223.255
10.255.224.0	10.255.224.1 - - -	10.255.255.254	10.255.255.255

11.) 10.0.0.0 /20

(i) New subnet mask

⇒ 255.1111111.11110000.00000000

⇒ 255.255.240.0



b) no. of networks =  $2^N$   
 $= 2^{12}$   
 $= 4096$

c) no. of valid Hosts per network =  $2^H - 2$   
 $= 2^{12} - 2$   
 $= \cancel{4094}$  4094

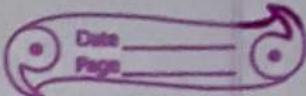
d) Jumping value

$$\rightarrow 256 - \cancel{240}$$

$$\rightarrow 16$$

e) Subnetting table

Nid	1st ip	last ip	Bid
10.0.0.0	10.0.0.1	- - -	10.0.35.254
10.0.16.0	10.0.16.1	- - -	10.0.31.254
10.0.32.0	10.0.32.1	- - -	10.0.47.254
10.0.48.0	10.0.48.1	- - -	10.0.63.254
10.0.64.0	10.0.64.1	- - -	10.0.79.254
10.0.80.0	10.0.80.1	- - -	10.0.95.254
10.0.96.0	10.0.96.81	- - -	10.0.111.254
10.0.112.0	10.0.112.1	- - -	10.0.127.254
10.0.128.0	10.0.128.1	- - -	10.0.143.254
10.0.144.0	10.0.144.1	- - -	10.0.159.254



10.0.160.0

10.285.244.0

10.285.160.0

10.285.176.0

10.285.192.0

10.285.208.0

10.285.224.0

10.285.240.0

10.0.175.255

10.255.159.255

10.255.175.255

10.255.191.255

10.255.207.255

10.255.223.255

10.255.239.255

10.255.255.255

Q.) 10.0.0.0 /21

a) New subnet mask

 $\Rightarrow 255.11111111.11111000.00000000$  $\Rightarrow 255.255.248.0$ b) no. of ~~valid networks~~ Networks =  $2^7$ 

$= 2^8$

$= 8192$

(c) no. of valid hosts per network =  $2^4 - 2$ 

$= 2^{11} - 2$

$= 2046$

a) Summing value

$$\Rightarrow 256 - 248$$

$$\Rightarrow 8$$

b) Subnetting table

Nid	1 <sup>st</sup> ip	last ip	Bid
10.0.0.0	10.0.0.1	10.0.7.254	10.0.7.255
10.0.8.0	10.0.8.1	10.0.15.254	10.0.15.255
10.0.16.0	10.0.16.1	10.0.23.254	10.0.23.255
10.0.24.0	10.0.24.1	10.0.31.254	10.0.31.255
10.0.32.0	10.0.32.1	10.0.39.254	10.0.39.255
10.0.40.0	10.0.40.1	10.0.47.254	10.0.47.255
10.0.48.0	10.0.48.1	10.0.55.254	10.0.55.255
10.0.56.0	10.0.56.1	10.0.63.254	10.0.63.255
;	;	;	;
;	;	;	;
10.255.192.0	10.255.192.1	10.255.199.254	10.255.199.255
10.255.200.0	10.255.200.1	10.255.207.254	10.255.207.255
10.255.208.0	10.255.208.1	10.255.215.254	10.255.215.255
10.255.216.0	10.255.216.1	10.255.223.254	10.255.223.255
10.255.224.0	10.255.224.1	10.255.231.254	10.255.231.255
10.255.232.0	10.255.232.1	10.255.239.254	10.255.239.255
10.255.240.0	10.255.240.1	10.255.247.254	10.255.247.255
10.255.248.0	10.255.248.1	10.255.255.254	10.255.255.255

13) 10.0.0.0 /22

a.) New Subnet mask

$\Rightarrow 255.11111111.11111100.00000000$

$\Rightarrow 255.255.252.0$

b.) No. of networks =  $2^n$

$$= 2^4$$

$$= 16384$$

c.) no. of valid hosts per network =  $2^H - 2$

$$= 2^{10} - 2$$

$$= 1022$$

d.) jumping value

$\Rightarrow 256 - 252$

$\Rightarrow 4$

e.) subnetting table

Nid	1 <sup>st</sup> ip	last ip	8id
10.0.0.0	10.0.0.1	10.0.3.254	10.0.3.255
10.0.4.0	10.0.4.1	10.0.7.254	10.0.7.255
10.0.8.0	10.0.8.1	10.0.11.254	10.0.11.255
10.0.12.0	10.0.12.1	10.0.15.254	10.0.15.255
10.0.16.0	10.0.16.1	10.0.19.254	10.0.19.255
10.0.20.0	10.0.20.1	10.0.23.254	10.0.23.255
:	:	:	:
10.255.236.0	10.255.236.1	10.255.239.254	10.255.239.255
10.255.240.0	10.255.240.1	10.255.243.254	10.255.243.255
10.255.244.0	10.255.244.1	10.255.247.254	10.255.247.255
10.255.248.0	10.255.248.1	10.255.251.254	10.255.251.255
10.255.252.0	10.255.252.1	10.255.255.254	10.255.255.255

(ii) 10.0.0.0 /23

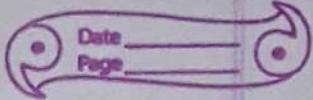
(a) New subnet ~~mask~~ mask

$\Rightarrow 255.1111111.11111110.00000000$

$\Rightarrow 255.\cancel{1111111}0.00000000 255.254.0$

b) No of network  $= 2^7$   
 $= 2^5$

$= 32768$



c.) No. of valid Hosts per network =  $2^M - 2$   
 $= 2^9 - 2$   
 $= 510$

d.) Jumping Value

$$\Rightarrow 256 - 254$$

$$= 2$$

e.) Subnetting table

NID	1 <sup>st</sup> ip	last ip	Bid
10.0.0.0	10.0.0.1	10.0.1.254	10.0.1.255
10.0.2.0	10.0.2.1	10.0.3.254	10.0.3.255
10.0.4.0	10.0.4.1	10.0.5.254	10.0.5.255
10.0.6.0	10.0.6.1	10.0.7.254	10.0.7.255
10.0.8.0	10.0.8.1	10.0.9.254	10.0.9.255
:	:	:	:
10.255.242.0	10.255.242.1	10.255.243.254	10.255.243.255
10.255.244.0	10.255.244.1	10.255.245.254	10.255.245.255
10.255.246.0	10.255.246.1	10.255.247.254	10.255.247.255
10.255.248.0	10.255.248.1	10.255.249.254	10.255.249.255
10.255.250.0	10.255.250.1	10.255.251.254	10.255.251.255
10.255.252.0	10.255.252.1	10.255.253.254	10.255.253.255
10.255.254.0	10.255.254.1	10.255.255.254	10.255.255.255

15) 10.0.0.0 /24

a) New subnet mask

$\Rightarrow \cancel{255.} 255.1111111.1111111.00000000$

$\Rightarrow 255.255.255.0$

$$\begin{aligned} b) \text{ No. of Network} &= 2^n \\ &= 2^{16} \\ &= 65536 \end{aligned}$$

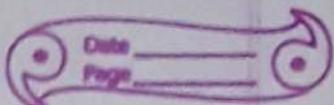
$$\begin{aligned} c) \text{ No. of Valid Hosts per network} &= 2^{n-2} \\ &= 2^8 - 2 \\ &= 254 \end{aligned}$$

d) Jumping value

$\Rightarrow 256 - 255$

$\Rightarrow 1$

e) Subnetting table



Nid	1st ip	last ip	Bid
10.0.0.0	10.0.0.1	10.0.0.254	10.0.0.255
10.0.1.0	10.0.1.1	10.0.1.254	10.0.1.255
10.0.2.0	10.0.2.1	10.0.2.254	10.0.2.255
10.0.3.0	10.0.3.1	10.0.3.254	10.0.3.255
10.0.4.0	10.0.4.1	10.0.4.254	10.0.4.255
10.0.5.0	10.0.5.1	10.0.5.254	10.0.5.255
:	:	:	:
10.255. <del>255</del> .0	10.255.251.1	10.255.251.254	10.255.251.255
10.255.252.0	10.255.252.1	10.255.252.254	10.255.252.255
10.255.253.0	10.255.253.1	10.255.253.254	10.255.253.255
10.255.254.0	10.255.254.1	10.255.254.254	10.255.254.255
10.255.255.0	10.255.255.1	10.255.255.254	10.255.255.255

16) 10.0.0.0 / 25

a) New subnet mask

$\Rightarrow 255.1111111.1111111.10000000$

$\Rightarrow 255.255.255.128$

b) no. of networks =  $2^n$   
 $= 2^{17}$   
 $= 131072$

c) No. of valid Hosts per network =  $2^7 - 2$   
 $= 128 - 2$   
 $= 126$

d) Jumping value »

$$\Rightarrow 256 - 128$$

$$\Rightarrow 128$$

e) Subnetting table

Nid	1 <sup>st</sup> ip	last ip	Bid
10.0.0.0	10.0.0.1	10.0.0.126	10.0.0.127
10.0.0.128	10.0.0.129	10.0.0.254	10.0.0.255
10.0.1.0	10.0.1.1	10.0.1.126	10.0.1.127
10.0.1.128	10.0.1.129	10.0.1.254	10.0.1.255
10.0.2.0	10.0.2.1	10.0.2.126	10.0.2.127
⋮	⋮	⋮	⋮
10.0.255.0	10.0.255.1	10.0.255.126	10.0.255.127
10.0.255.128	10.0.255.129	10.0.255.254	10.0.255.255
10.1.0.0	10.1.0.1	10.1.0.126	10.1.0.127
10.1.0.128	10.1.0.129	10.1.0.254	10.1.0.255
10.1.1.0	10.1.1.1	10.1.1.126	10.1.1.127
10.1.1.128	10.1.1.129	10.1.1.254	10.1.1.255

10.1.2.0	10.1.2.1	10.1.2.126	10.1. <del>125</del> 2.127
10.255.250.128	10.255.250.129	10.255.250.254	10.255.250.255
10.255.251.0	10.255.251.1	10.255.251.126	10.255.251.127
10.255.251.128	10.255.251.129	10.255.251.254	10.255.251.255
10.255.252.0	10.255.252.1	10.255.252.126	10.255.252.127
10.255.252.128	10.255.252.129	10.255.252.254	10.255.252.255
10.255.253.0	10.255.253.1	10.255.253.126	10.255.253.127
10.255.253.128	10.255.253.129	10.255.253.254	10.255.253.255
10.255.254.0	10.255.254.1	10.255.254.126	10.255.254.127
10.255.254.128	10.255.254.129	10.255.254.254	10.255.254.255
10.255.255.0	10.255.255.1	10.255.255.126	10.255.255.127
10.255.255.128	10.255.255.129	10.255.255.254	10.255.255.255

17.) 10.0.0.0 /26

a) new subnet mask

$\Rightarrow$  255.1111111.1111111.11000000

$\Rightarrow$  255.255.255.192

b) no. of networks =  $2^n$

$$= 2^{18}$$

$$= 262144$$

c.) no. of valid hosts per network =  $2^H - 2$   
 $= 2^6 - 2$   
 $= 64 - 2$   
 $= 62$

d.) Jumping value

$$\Rightarrow 256 - 492$$

$$\Rightarrow 64$$

e.) Subnetting table

Nid	1 <sup>st</sup> IP	last IP	Bid
10.0.0.0	10.0.0.1	10.0.0.62	10.0.0.63
10.0.0.64	10.0.0.65	10.0.0.126	10.0.0.127
10.0.0.128	10.0.0.129	10.0.0.190	10.0.0.191
10.0.0.192	10.0.0.193	10.0.0.254	10.0.0.255
10.0.1.0	10.0.1.1	10.0.1.62	10.0.1.63
10.0.255.192	10.0.255.193	10.0.255.254	10.0.255.255
10.1.0.0	10.1.0.1	10.1.0.62	10.1.0.63
10.1.0.64	10.1.0.65	10.1.0.126	10.1.0.127
10.1.0.128	10.1.0.129	10.1.0.190	10.1.0. <del>191</del> 191
10.255.255.128	10.255.255.129	10.255.255.190	10.255.255.191
10.255.255.192	10.255.255.193	10.255.255.254	10.255.255.255

18) 10.0.0.0 /27

a) New subnet mask

$$\Rightarrow 255.11111110.11111111.11100000$$

$$\Rightarrow 255.255.255.224$$

$$\begin{aligned} b) \text{ no. of networks} &= 2^{\text{N}} \\ &= 2^{19} \\ &= 524288 \end{aligned}$$

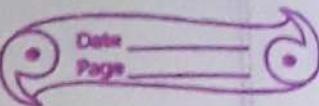
$$\begin{aligned} c) \text{ no. of valid hosts per network} &= 2^{\text{H}} - 2 \\ &= 2^5 - 2 \\ &= 30 \end{aligned}$$

d) Jumping value

$$\Rightarrow 256 - 224$$

$$\Rightarrow 32$$

e) Subnetting table



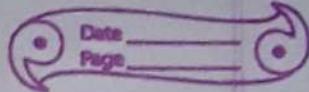
Nid	1 <sup>st</sup> IP	last IP	BID
10.0.0.0	10.0.0.1	10.0.0.30	10.0.0.31
10.0.0.32	10.0.0.33	10.0.0.62	10.0.0.63
10.0.0.64	10.0.0.65	10.0.0.94	10.0.0.95
10.0.0.96	10.0.0.97	10.0.0.128	10.0.0.127
10.0.0.128	10.0.0.129	10.0.0.158	10.0.0.159
10.0.0.160	10.0.0.161	10.0.0.190	10.0.0.191
10.0.0.192	10.0.0.193	10.0.0.222	10.0.0.223
10.0.0.224	10.0.0.225	10.0.0.254	10.0.0.255
10.0.1.0	10.0.1.1	10.0.1.30	10.0.1.31
:	:	:	:
10.255.255.96	10.255.255.97	10.255.255.126	10.255.255.127
10.255.255.128	10.255.255.129	10.255.255.158	10.255.255.159
10.255.255.160	10.255.255.161	10.255.255.190	10.255.255.191
10.255.255.192	10.255.255.193	10.255.255.222	10.255.255.223
10.255.255.224	10.255.255.225	10.255.255.254	10.255.255.255

Q.) 10.0.0.0 /28

a) New subnet mask

$\Rightarrow$  ~~255.~~ 255.11111111. 11111111. 11110000

$\Rightarrow$  255.255.255.240



b) No. of networks:  $2^9$   
 $= 2^{20}$   
 $= 1048576$

c) No. of valid Hosts per network =  $2^4 - 2$   
 $= 2^4 - 2$   
 $= 14$

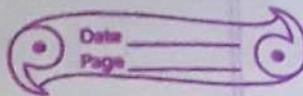
d.) Jumping value

$\Rightarrow 256 - 240$

$\Rightarrow 16$

e.) Subnetting table

Nid	1st ip	last ip	Bid
10.0.0.0	10.0.0.1	10.0.0.14	10.0.0.15
10.0.0.16	10.0.0.17	10.0.0.30	10.0.0.31
10.0.0.32	10.0.0.33	10.0.0.46	10.0.0.47
10.0.0.48	10.0.0.49	10.0.0.62	10.0.0.63
10.0.0.64	10.0.0.65	10.0.0.78	10.0.0.79
10.0.0.80	10.0.0.81	10.0.0.94	10.0.0.95
10.0.0.96	10.0.0.97	10.0.0.110	10.0.0.111
10.0.0.112	10.0.0.113	10.0.0.126	10.0.0.127
10.0.0.128	10.0.0.129	10.0.0.142	10.0.0.143
10.0.0.144	10.0.0.145	10.0.0.158	10.0.0.159



10.0.0.160	10.0.0.161	10.0.0.174	10.0.0.175
10.0.0.176	10.0.0.177	10.0.0.190	10.0.0.191
10.0.0.192	10.0.0.193	10.0.0.206	10.0.0.207
10.0.0.208	10.0.0.209	10.0.0.222	10.0.0.223
10.0.0.224	10.0.0.225	10.0.0.238	10.0.0.239
10.0.0.240	10.0.0.241	10.0.0.254	10.0. <del>255</del> 0.255
10.0.1.0	10.0.1.1	10.0.1.14	10.0.1.15
:	:	:	:
10.255.255.176	10.255.255.177	10.255.255.190	10.255.255.191
10.255.255.192	10.255.255.193	10.255.255.206	10.255.255.207
10.255.255.208	10.255.255.209	10.255.255.222	10.255.255.223
10.255.255.224	10.255.255.225	10.255.255.238	10.255.255.239
10.255.255.240	10.255.255.241	10.255.255.254	10.255.255.255

20) 10.0.0.129

a) New Subnet mask

$\Rightarrow 255.1111111.1111111.1111000$

$\Rightarrow 255.255.255.248$

b) No. of networks?  $2^n$

$$= 2^7$$

$$= 128$$

c.) no. of valid Hosts per network =  $2^H - 2$   
 $= 2^3 - 2$   
 $= 6$

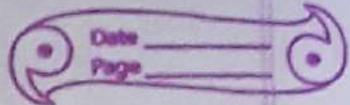
d.) Jumping value

$$\Rightarrow 256 - 248$$

$$\Rightarrow 8$$

e.) Subnetting table

Nid	1 <sup>st</sup> ip	- - -	last ip	Bid
10.0.0.0	10.0.0.1	- - -	10.0.0.86	10.0.0.7
10.0.0.8	10.0.0.9	- - -	10.0.0.14	10.0.0.15
10.0.0.16	10.0.0.17	- - -	10.0.0.22	10.0.0.23
10.0.0.24	10.0.0.25	- - -	10.0.0.30	10.0.0.31
10.0.0.32	10.0.0.33	- - -	10.0.0.38	10.0.0.39
:	:	:	:	:
:	:	:	:	:
:	:	:	:	:
:	:	:	:	:
10.255.255.216	10.255.255.217	- - -	10.255.255.222	10.255.255.223
10.255.255.224	10.255.255.225	- - -	10.255.255.230	10.255.255.231
10.255.255.232	10.255.255.233	- - -	10.255.255.238	10.255.255.239
10.255.255.240	10.255.255.241	- - -	10.255.255.246	10.255.255.247
10.255.255.248	10.255.255.249	- - -	10.255.255.254	10.255.255.255



21) 10.0.0.0 130

b) New subnetmask

$\Rightarrow 255.11111111.11111111.11111100$

$\Rightarrow 255.255.255.252$

b) No. of ~~valid hosts~~ Networks =  $2^{\text{?}}$

$$= 2^{22}$$

$$= 4194304$$

c) No. of Valid Hosts per network =  $2^{\text{?}} - 2$

$$= 2^2 - 2$$

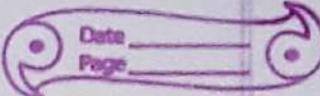
$$= 2$$

d) Jumping value

$\Rightarrow 256 - 252$

$\Rightarrow 4$

e) Subnetting table



Nid	1st IP	last IP	8th
10.0.0.0	10.0.0.1	10.0.0.2	10.0.0.13
10.0.0.4	10.0.0.5	10.0.0.6	10.0.0.7
10.0.0.8	10.0.0.9	10.0.0.10	10.0.0.11
10.0.0.12	10.0.0.13	10.0.0.14	10.0.0.15
10.0.0.16	10.0.0.17	10.0.0.18	10.0.0.19
10.0.0.20	10.0.0.21	10.0.0.22	10.0.0.23
10.0.0.24	10.0.0.25	10.0.0.26	10.0.0.27
10.0.0.28	10.0.0.29	10.0.0.30	10.0.0.31
10.0.0.32	10.0.0.33	10.0.0.34	10.0.0.35
10.0.0.36	10.0.0.37	10.0.0.38	10.0.0.39
10.0.0.40	10.0.0.41	10.0.0.42	10.0.0.43
10.255.255.228	10.255.255.229	10.255.255.230	10.255.255.231
10.255.255.232	10.255.255.233	10.255.255.234	10.255.255.235
10.255.255.236	10.255.255.237	10.255.255.238	10.255.255.239
10.255.255.240	10.255.255.241	10.255.255.242	10.255.255.243
10.255.255.244	10.255.255.245	10.255.255.246	10.255.255.247
10.255.255.248	10.255.255.249	10.255.255.250	10.255.255.251
10.255.255.252	10.255.255.253	10.255.255.254	10.255.255.255

22) 10.0.0.0 /21

a) New Subnet mask:

$$\Rightarrow 255.11111110 \cdot 11111111.11111110$$

$$\Rightarrow 255.255.255.254$$

$$\begin{aligned} b) \text{ No. of networks} &= 2^7 \\ &= \cancel{8} 2^3 \\ &= 8388608 \end{aligned}$$

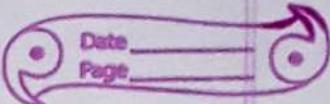
$$\begin{aligned} c) \text{ No. of valid Hosts per network} &= 2^4 - 2 \\ &= 2^4 - 2 \\ &= 0 \end{aligned}$$

d) Jumping value

$$\Rightarrow 256 - 254$$

$$\Rightarrow 2$$

e) Subnetting table



Nid	1st ip	last ip	Bid
10.0.0.0			10.0.0.1
10.0.0.2			10.0.0.3
10.0.0.4			10.0.0.5
10.0.0.6			10.0.0.7
10.0.0.8			10.0.0.9
:			:
10.255.255.246			10.255.255.247
10.255.255.248			10.255.255.249
10.255.255.250			10.255.255.251
10.255.255.252			10.255.255.253
10.255.255.254			10.255.255.255

Q3) 10.0.0.0 /32

a) New subnet mask

$$\begin{aligned} \Rightarrow & 255.11111111.11111111.11111111 \\ \Rightarrow & 255.255.255.255 \end{aligned}$$

$$\begin{aligned} b) \text{ No. of networks} &= 2^n \\ &= 2^8 \\ &= 16777216 \end{aligned}$$

1) Do the subnetting of 192.168.10.0 using CIDR value 29.

→

a) New subnet mask

$$\Rightarrow 255 \cdot 255 \cdot 255 \cdot 1111000$$

$$\Rightarrow 255 \cdot 255 \cdot 255 \cdot 248$$

$$\begin{aligned} b) \text{ No. of Networks} &= 2^7 \\ &= 2^5 \\ &= 32 \end{aligned}$$

$$\begin{aligned} c) \text{ No. of Valid Hosts per network} &= 2^{7-2} \\ &= 2^3 - 2 \\ &= 6 \end{aligned}$$

d) Jumping Value

$$\Rightarrow 256 - 248$$

$$\Rightarrow 8$$

e) Subnetting table

Nid	1 <sup>st</sup> ip	Last ip	Bid
192.168.10.0	192.168.10.1	192.168.10.6	192.168.10.7
192.168.10.8	192.168.10.9	192.168.10.14	192.168.10.15
192.168.10.16	192.168.10.17	192.168.10.22	192.168.10.23
192.168.10.24	192.168.10.25	192.168.10.30	192.168.10.31
⋮	⋮	⋮	⋮

192.168.10.208	192.168.10.209	..	192.168.10.214	192.168.10.2075
192.168.10.216	192.168.10.217	..	192.168.10.222	192.168.10.223
192.168.10.224	192.168.10.225	..	192.168.10.230	192.168.10.231
192.168.10.232	192.168.10.233	..	192.168.10.238	192.168.10.239
192.168.10.240	192.168.10.241	..	192.168.10.246	192.168.10.247
192.168.10.248	192.168.10.249	..	192.168.10.254	192.168.10.255

2) Do the subnetting of 172.168.0.0 using (IDR value 3).

→

a) new subnet mask

$$\Rightarrow 255.255.11100000.00000000$$

$$\Rightarrow 255.255.224.0$$

$$\begin{aligned} b) \text{ No of Networks} &= 2^3 \\ &= 2^3 \\ &= 8 \end{aligned}$$

$$\begin{aligned} c) \text{ No. of Valid Hosts per network} &= 2^3 - 2 \\ &= 2^3 - 2 \\ &= 8-2 \end{aligned}$$

d). jumping value

$$\Rightarrow 256 - 224$$

$$\Rightarrow 32$$

② Subnetting table

Nid	1st ip		last ip	Bid
172.168.0.0	0.1	- - -	31.254	172.168. 31.255
172.168.32.0	32.1	- - -	63.254	172.168.63.255
172.168.64.0	64.1	- - -	95.254	172.168.95.255
172.168.96.0	96.1	- - -	127.1254	172.168.127.255
172.168.128.0	128.1	- - -	159.254	172.168.159.255
172.168.160.0	160.1	- - -	191.254	172.168.191.255
172.168.192.0	192.1	- - -	223.254	172.168.223.255
172.168.224.0	224.1	- - -	255.254	172.168.255.255
<del>172.168.0</del>				

3) Design and calculate network addresses with VLSM.

100 hosts  $\Rightarrow$  Network A

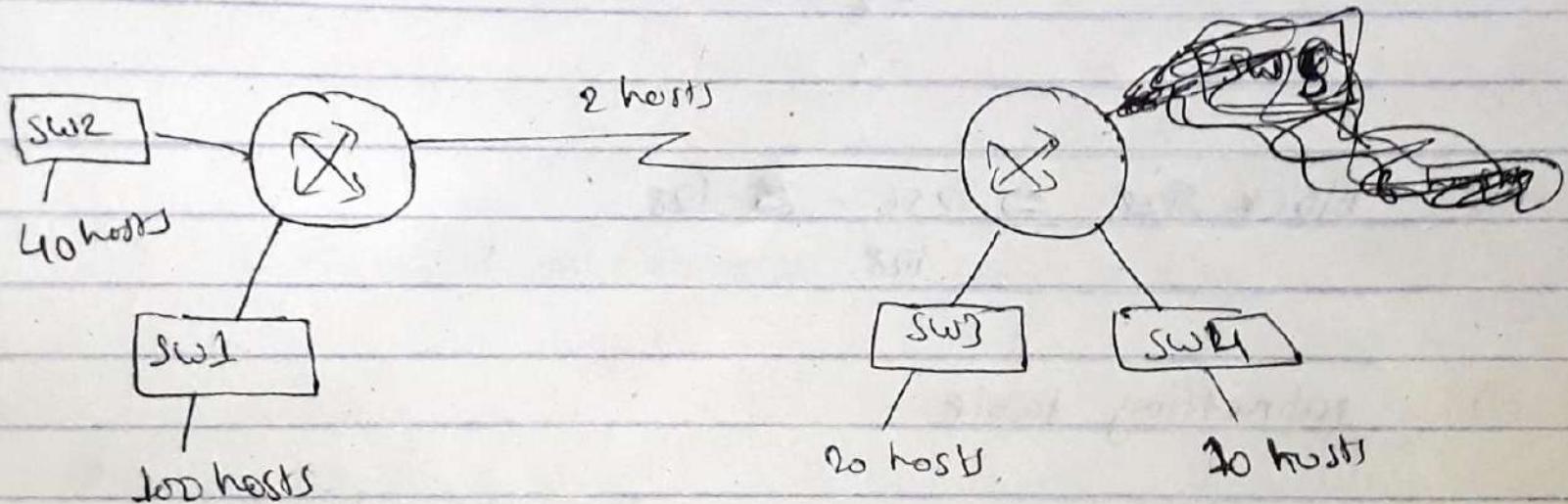
40 hosts  $\Rightarrow$  Network B

20 hosts  $\Rightarrow$  Network C

10 hosts  $\Rightarrow$  Network D

~~2 hosts  $\Rightarrow$  Network E~~

2 hosts  $\Rightarrow$  Network E



$\Rightarrow$  class C : 240.168.10.0

for  $100 + 1$  hosts  $1205$

$$\text{a) no. of valid hosts} \leq 2^7 - 2$$

$$100+1 \leq 2^7 - 2$$

$$101 \leq 126$$

b) subnet mask

$$\Rightarrow 255.255.255.10000000$$

$$\Rightarrow 255.255.255.11111100$$

$$\text{c) no. of network} \Rightarrow 2^7$$

$$= 2^1$$

$$= 2$$

$$\text{d) block size} \Rightarrow 256 - 128$$

$$= 128$$

e) subnetting table

Net	1st ip	last ip	Brd
210.168.10.0	210.168.10.1	210.168.10.126	210.168.10.127
210.168.10.128	210.168.10.128	210.168.10.254	210.168.10.255

for 40+ valid hosts / 26

$$\text{a) no. of valid hosts} \leq 2^H - 2$$

$$40 + 1 \leq 2^6 - 2$$

$$41 \leq 64 - 2$$

$$41 \leq 62$$

b) Subnet mask

$$\Rightarrow 255.255.255.11000000$$

$$\Rightarrow 255.255.255.192$$

$$\text{c) no. of network} \Rightarrow 2^n$$

$$= 2^2$$

$$= 4$$

$$\text{d) Block size} \Rightarrow 256 - 192$$

$$\Rightarrow 64$$

e) Subnetting table

Net	1st ip	Last ip	Bid
210.168.10.0	210.168.10.1	210.168.10.62	210.168.10.63
210.168.10.64	210.168.10.65	210.168.10.126	210.168.10.127
210.168.10.128	210.168.10.129	210.168.10.190	210.168.10.191
210.168.10.192	210.168.10.193	210.168.10.254	210.168.10.255

for 20+1 valid hosts /27

a) no. of valid hosts  $\leq 2^H - 2$   
 $20+1 \leq 2^5 - 2$   
 $21 \leq 30$

b) Subnet mask

$$\Rightarrow 255 \cdot 255 \cdot 255 \cdot 11100000$$

$$\Rightarrow 255 \cdot 255 \cdot 255 \cdot 224$$

c) no. of networks  $\Rightarrow 2^n$   
 $\Rightarrow 2^3$   
 $= 8$

d) Block size  $\Rightarrow 256 - 224$   
 $\Rightarrow 32$

e) Subnetting table

Net	1st ip	Last ip	Brd
210.168.10.0	210.168.10.1	210.168.10.30	210.168.10.31
210.168.10.32	210.168.10.33	210.168.10.62	210.168.10.63
210.168.10.64	210.168.10.65	210.168.10.94	210.168.10.95
210.168.10.96	210.168.10.97	210.168.10.126	210.168.10.127
210.168.10.128	210.168.10.129	210.168.10.158	210.168.10.159
210.168.10.160	210.168.10.161	210.168.10.190	210.168.10.191
210.168.10.192	210.168.10.193	210.168.10.222	210.168.10.223
210.168.10.224	210.168.10.225	210.168.10.254	210.168.10.255

for  $b+1$  hosts  $\rightarrow 128$

a) no. of valid hosts  $\leq 2^h - 2$

$$10+1 \leq 2^4 - 2$$

$$11 \leq 14$$

b) Subnet mask

$$\Rightarrow 255 \cdot 255 \cdot 255 \cdot 11110000$$

$$\Rightarrow 255 \cdot 255 \cdot 255 \cdot 240$$

c) no. of networks  $= 2^n$

$$= 2^4$$

$$= 16$$

d) Block size  $\Rightarrow 256 - 240$

$$\Rightarrow 16$$

e) Subnetting table

Mask	1st ip	Last ip	Block
250.168.10.0	250.168.10.1	250.168.10.14	250.168.10.15
250.168.10.16	250.168.10.17	250.168.10.30	250.168.10.31
250.168.10.32	250.168.10.33	250.168.10.46	250.168.10.47
250.168.10.48	250.168.10.49	250.168.10.62	250.168.10.63
250.168.10.64	250.168.10.65	250.168.10.78	250.168.10.79
250.168.10.80	250.168.10.81	250.168.10.94	250.168.10.95
250.168.10.96	250.168.10.97	250.168.10.110	250.168.10.111
250.168.10.112	250.168.10.113	250.168.10.126	250.168.10.127
250.168.10.240	250.168.10.241	250.168.10.254	250.168.10.255

for 6+1 valid hosts / 28

a) no. of valid hosts  $\leq 2^H - 2$

$$\begin{array}{l} 6+1 \\ \text{---} \\ 7 \end{array} \leq \cancel{10} \cancel{00} 2^4 - 2$$

$$\leq 14$$

b) Subnet mask

$$\Rightarrow 255.255.255.\underset{\text{---}}{11110000}$$

$$\Rightarrow 255.255.255.240$$

c) no. of networks  $\Rightarrow 2^N$

$$\begin{array}{l} \text{---} \\ \Rightarrow 2^4 \\ \Rightarrow 16 \end{array}$$

d) Block size  $\Rightarrow 256 - 240$

$$\Rightarrow 16$$

for 2 valid hosts / 30

a) no. of valid hosts  $\leq 2^H - 2$

$$\begin{array}{l} 2 \\ \text{---} \\ 2 \end{array} \leq 2^2 - 2$$

$$\leq 2$$

b) Subnet mask

$$\Rightarrow 255.255.255.\underset{\text{---}}{11111100}$$

$$\Rightarrow 255.255.255.252$$

c) no. of networks  $\Rightarrow 2^n$

$$= \frac{6}{2}$$

$$= 64$$

d) Block size  $\Rightarrow 256 - 252$

$$\Rightarrow \cancel{2} \cdot 4$$

e) Subnetting table

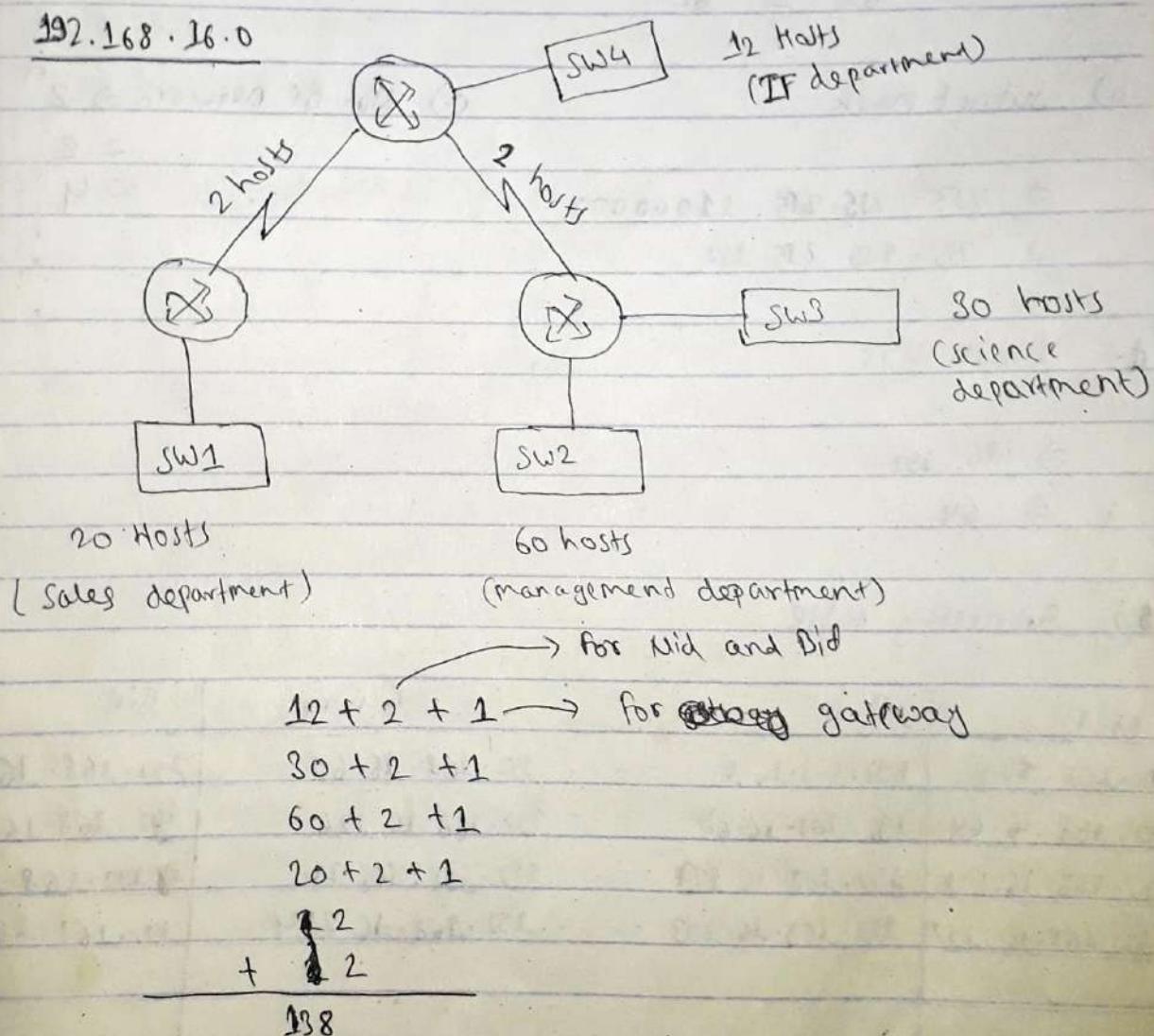
Nid	1 <sup>st</sup> ip	Last ip	Dir
210.168.10.0	210.168.10.1	210.168.10.2	210.168.10.3
210.168.10.4	210.168.10.5	210.168.10.6	210.168.10.7
!	!	!	!
210.168.10.224	210.168.10.225	210.168.10.226	210.168.10.227
210.168.10.228	210.168.10.229	210.168.10.230	210.168.10.231
210.168.10.232	210.168.10.233	210.168.10.234	210.168.10.235
210.168.10.236	210.168.10.237	210.168.10.238	210.168.10.239
210.168.10.240	210.168.10.241	210.168.10.242	210.168.10.243
210.168.10.244	210.168.10.245	210.168.10.246	210.168.10.247
210.168.10.248	210.168.10.249	210.168.10.250	210.168.10.251
210.168.10.252	210.168.10.253	210.168.10.254	210.168.10.255

Now,

Network Name	Network id	Valid ip	Broadcast id	cidr	subnet mask
Network A	210.168.10.0	210.168.10.1 — 210.168.10.126	210.168.10.127	125	255.255.255.128
Network B	210.168.10.128	210.168.10.129 — 210.168.10.250	210.168.10.191	126	255.255.255.192
Network C	210.168.10. <del>192</del>	210.168.10. <del>192</del> — 210.168.10.222	210.168.10.223	127	255.255.255.224
Network D	210.168.10.224	210.168.10.225 — 210.168.10.238	210.168.10.239	128	255.255.255.240
Network E	210.168.10. <del>240</del>	210.168.10.241 — 210.168.10.254	210.168.10.255	128	255.255.255.240
Network E	210.168.10.240	210.168.10.241 — 210.168.10.242	210.168.10.243	120	255.255.255.252

## VLSM (Variable length subnet mask)

- In subnetting, we divided one large network into small networks with a subnet mask of same length.
- But using ~~not~~ VLSM, we can divide one large network into subnets with subnet mask of different length and we can choose the length of mask according to the no. of hosts required on our network.



Here, if we took Class C ip address which has ~~more~~ 256 Hosts. It is enough for us. So we took class c ip address.

For hosts  
For gateway  
For 60+valid hosts 126

a) No. of valid hosts per network  $\leq 2^4 - 2$

$$\begin{aligned} \text{a.) No. of Valid Hosts} &\leq 2^4 - 2 \\ 60 + 1 &\leq 2^6 - 2 \\ 61 &\leq 62 \end{aligned}$$

b) Subnet mask

$$\begin{aligned} \text{c.) No. of network} &= 2^2 \\ &= 4 \end{aligned}$$

$$\Rightarrow 255.255.255.11000000$$

$$\Rightarrow 255.255.255.192$$

d) Block size

$$\Rightarrow 256 - 192$$

$$\Rightarrow 64$$

e) Subnetting table

Mid	1st ip	Last ip	Block
192.168.16.0	192.168.16.1	192.168.16.62	192.168.16.63
192.168.16.64	192.168.16.65	192.168.16.126	192.168.16.127
192.168.16.128	192.168.16.129	192.168.16.190	192.168.16.191
192.168.16.192	192.168.16.193	192.168.16.254	192.168.16.255

for 30+1 valid hosts 126

a) No. of valid Hosts  $\leq 2^4 - 2$

$$\begin{array}{ll} 30+1 & \leq 2^6 - 2 \\ 31 & \leq 62 \end{array}$$

b) ~~Subnetmask~~

$$\Rightarrow 255.255.255.11000000$$

$$\Rightarrow 255.255.255.192$$

c) no. of networks  $\Rightarrow 2^2$

$$\begin{array}{l} = 2^2 \\ = 4 \end{array}$$

d) Block size

$$\Rightarrow 256 - 192$$

$$\Rightarrow 64$$

for 20+1 valid hosts 127

a) no. of valid Hosts  $\leq 2^4 - 2$

$$\begin{array}{ll} 20+1 & \leq 2^5 - 2 \\ 21 & \leq 30 \end{array}$$

### b) Subnet mask

$$\Rightarrow 255.255.255.111\ 00000$$

$$\Rightarrow 255.255.255.224$$

c) no. of network  $\Rightarrow 2^n$   
 $= 2^3$   
 $= 8$

### d) Block size

$$\Rightarrow 256 - 224$$

$$\Rightarrow 32$$

### e) Subnetting table

Nid	1st ip	Last ip	Bid
192.168.16.0	192.168.16.1	192.168.16.30	192.168.16.31
192.168.16.32	192.168.16.33	192.168.16.62	192.168.16.63
192.168.16.64	192.168.16.65	192.168.16. <del>87</del> <sup>94</sup> 95	192.168.16.95
192.168.16.96	192.168.16.97	192.168.16.126	192.168.16.127
192.168.16.128	192.168.16.129	192.168.16.158	192.168.16.159
192.168.16.160	192.168.16.161	192.168.16.190	192.168.16.191
192.168.16.192	192.168.16.193	192.168.16.222	192.168.16.223
192.168.16.224	192.168.16.225	192.168.16.224	192.168.16.225

for ~~12+1~~ valid Hosts 128

a) no. of valid hosts  $\leq 2^n - 2$

$$12 + 1 \leq 2^4 - 2$$

$$13 \leq 14$$

b) Subnet mask

$$\Rightarrow 255.255.255.\dots 11110000$$

$$\Rightarrow 255.255.255.240$$

c) no. of network =  $2^n$

$$= 2^4$$

$$= 16$$

d) Block size

$$= 256 - 240$$

$$= 16$$

e) Subnetting table

Nid	1st ip	Last ip	Did
192.168.16.0	192.168.16.1	192.168.16.14	192.168.16.15
192.168.16.16	192.168.16.17	192.168.16.30	192.168.16.21
192.168.16.32	192.168.16.33	192.168.16.46	192.168.16.47
192.168.16.48	192.168.16.49	192.168.16.62	192.168.16.63
192.168.16.64	192.168.16.65	192.168.16.78	192.168.16.79
192.168.16.80	192.168.16.81	192.168.16.94	192.168.16.95

192.168.16.96	192.168.16.97 - - .	192.168.16.110	192.168.16.111
192.168.16.112	192.168.16.113 - - .	192.168.16.128 6	192.168.16.127
192.168.16.128	192.168.16.129 - - .	192.168.16.144 2	192.168.16.143
192.168.16.144	192.168.16.145 - - .	192.168.16.158	192.168.16.159
192.168.16.160	192.168.16.161 - - .	192.168.16.174	192.168.16.175
192.168.16.176	192.168.16.177 - - .	192.168.16.190	192.168.16.191
192.168.16.192	192.168.16.193 - - .	192.168.16.206	192.168.16.207
192.168.16.208	192.168.16.208 - - .	192.168.16.222	192.168.16.223
192.168.16.224	192.168.16.225 - - .	192.168.16.238	192.168.16.239
192.168.16.240	192.168.16.241 - - .	192.168.16.254	192.168.16.255

for 2 valid Hosts

130 (Router to Router so that No gateway)

a) No. of valid hosts  $\leq 2^H - 2$

$$\begin{array}{rcl} 2 & \leq & 2^2 - 2 \\ 2 & \leq & 2 \end{array}$$

b) Subnet mask

$$\Rightarrow 255.255.255 \cdot 11111100$$

$$\Rightarrow 255.255.255. 252$$

c) no. of network  $\geq 2^n$

$$\begin{array}{rcl} & = 2^6 \\ & = 64 \end{array}$$

d) Block size

$$\Rightarrow 256 - 252$$

$$\Rightarrow 4$$

## (2) Subnetting table

Nid	1st ip	last ip	Bid
192.168.16.0	192.168.16.1	192.168.16.2	192.168.16.3
192.168.16.4	192.168.16.5	192.168.16.6	192.168.16.7
:	:	:	:
192.168.16.228	192.168.16.229	192.168.16.230	192.168.16.231
192.168.16.232	192.168.16.233	192.168.16.234	192.168.16.235
192.168.16.236	192.168.16.237	192.168.16.238	192.168.16.239
192.168.16.240	192.168.16.241	192.168.16.242	192.168.16.243
192.168.16.244	192.168.16.245	192.168.16.246	192.168.16.247
192.168.16.248	192.168.16.249	192.168.16.250	192.168.16.251
192.168.16.252	192.168.16.253	192.168.16.254	192.168.16.255

Now,

for 60 valid hostsnetwork id : 192.168.~~0~~ 16. 0

cidr : /28

subnet mask : 255.255.255.192

valid ip : 192.168.16.1 - 192.168.16.62

broadcast id : 192.168.16.63

for 30 hosts

network id : 192.168.16.64

subnet cidr : 126

subnet mask : 255.255.255.~~255~~ 192

valid ip : 192.168.16.65 — 192.168.16.~~255~~ 126

broadcast id : 192.168.16.~~255~~ 127

for 20 hosts

network id : 192.168.16.128

cidr : 127

subnet mask : 255.255.255.224

valid ip : 192.168.16.129 — 192.168.16.158

broadcast id : 192.168.16.159

for 12 hosts

network id : 192.168.16.160

cidr : 128

subnet mask : 255.255.255.240

valid ip : 192.168.16.161 — 192.168.16.174

broadcast id : 192.168.16.175

for 2 hosts

network id : 192.168.16.~~255~~ 176

cidr : 130

subnet mask : 255.255.255.252

valid ip: 192.168.16.177 - 192.168.16.178

Bld : 192.168.16.179

for 2 valid hosts

network id: 192.168.16.180

Sub cidr : 130

Subnet mask: 255.255.255.252

valid ip : 192.168.16.181 - 192.168.16.182

Bld : 192.168.16.183