192.168.1.15/26

↑ Network Bits

Q1 ⇒ Subnet Mask in Decimal

Class-C

By Default N/w Bits ⇒ 24

But Here ⇒ /26

↓

24+2

Class C Subnet Mask [11111111.11111111.11111111.00000000]

But as per Question ↓↓

24 + 2 ⇒ 26 N/w Bits

11111111.11111111.11111111.11000000

255 . 255 . 255 . ↓↓

$2^7 + 2^6 + \cdots + 2^1 + 2^0$

$128 + 64 + 0 + \cdots + 0$

192

Subnet Mask ⇒ 255.255.255.192

Q2 ⇒ Find Block Size ⇒ 2^{32-n}

$n = 26$

$2^{32-26} \Rightarrow 2^6 \Rightarrow 64$ ip

Block Size = 64

Q3 ⇒ Network id ⇒ Set right most 32-n bits to 0s.

192.168.1.15/26

11000000.10101000.00000001.00001111

32-26 ⇒ 6

↓↓ Set as 0

.00000000

N/w id ⇒ 192.168.1.0

If No. of ip in Subnet ⇒ 64

So Range of ip

192.168.1.0 ← Networkid

⇓

192.168.1.1 ← First usable ip

⋮

192.168.1.62 ← Last usable ip

192.168.1.63 ← Broadcast address

Total No. of Subnet ⇒ No. of bit taken from Host part

⇒ 24 , 8
N/w Host

But Here 26 N/w

So total 2 bit borrowed that we are representing as m bit.

No of Subnet ⇒ 2^m

$2^2 = 4$ Subnet

Subnet 1	Subnet 2	Subnet 3	
192.168.1.0	192.168.1.64	192.168.1.128	192.168.1.192
↕	↕	↕	↕
192.168.1.63	192.168.1.127	192.168.1.191	192.168.1.255

Q2 ⇒ How many subnets and Hosts per subnet can you get from the Network 192.168.1.0 255.255.255.224 ?

Sol

192.168.1.0

↑

Class C, Default Mask in class C ⇒

255.255.255.0

But in question ⇒ 255.255.255.224

⇓

11100000

$2^7 + 2^6 + 2^5$

128 + 64 + 32

224

Means 3 bit borrowed from Host part

$m = 3$

No. of Subnet ⇒ 2^m

2^3 ⇒ 8 Subnet

No. of Host in every Subnet ?

⇒ By Default in class C 8 bit

but 3 bit converted into Network

So Remaining 8-3 ⇒ 5 bit

2^5 ⇒ 32 ip

from 32, first ip is N/w address

and last ip is Broadcast

So in each Subnet there is 30 usable ip.

Q3 → Suppose you purchase the IP of class C
192.168.20.0/24
But the requirement of organization is to distribute among 8 Subnets!

Sol

ip → 192.168.20.0/24
↑
By default 24 N/w bits in Class C.

To create 8 Subnet we need to borrow bit from Host part.

$2^3 = 8$
So borrow 3bit

Remaining Host Bit ⇒ 8-3
= 5bit

N/w Bit Now ⇒ 24+3
⇒ 27

$2^0 = 1$
$2^1 = 2$
$2^2 = 4$
$2^3 = 8$ ⟸
$2^4 = 16$
$2^5 = 32$
$2^6 = 64$
$2^7 = 128$

As per this Subnet Mask
255.255.255.111-----

Subnet Mask = 255.255.255.224

No of Host in each Subnet ⇒ $2^{\text{Host Bit}}$
⇒ 2^5
Host ⇒ 32 ip

Range of ip in Subnets.

192.168.20.0	...20.32	20.64	96	128	160	192	224
192.168.20.1							
!							
192.168.20.30							
192.168.20.31	20.63	20.95	127	159	191	223	255