**Question 1:**

**Base address:** 142.150.235.0 **Network mask:** 255.255.255.224 **Broadcast address:** 142.150.235.31 **Reserved Router address:** 142.150.235.1

a) What is the address of the assigned subnetwork and what is the extended network prefix?b) Which IP addresses can I use to configure the computers in my lab?c) Suppose I wanted to do subdivide the assigned address block into 4 smaller subnetworks of equal size. How large are these networks, and how many IP addresses can I assign in each subnetwork?

**Solution:**

**Subnet Mask:** 255.255.255.224 (11111111.11111111.11111111.11100000)

This gives /27 network with 27 network bits and 5 host bits.

256-224 = 32 → range

2^3 = 8 subnets

2^5 = 32-2 = 30 host IPs

1. **Subnetwork Addresses with extended network prefix:**
   * 142.150.235.0/27 – 142.150.235.31/27
   * 142.150.235.32/27 – 142.150.235.63/27
   * 142.150.235.64/27 – 142.150.235.95/27
   * 142.150.235.96/27 – 142.150.235.127/27
   * 142.150.235.128/27 – 142.150.235.159/27
   * 142.150.235.160/27 – 142.150.235.191/27
   * 142.150.235.192/27 – 142.150.235.223/27
   * 142.150.235.224/27 – 142.150.235.255/27
2. **Ip Address for Computer:**
   * Suppose we will be using network 142.150.235.0/27 – 142.150.235.31/27
     + 142.150.235.1 is reserved for Router
     + **So, we can use IP Address for Computer in lab**
       - **142.150.235.2**
3. **Subdivision of given block to 4 subnetworks:**
   * To the given block of 142.150.235.0/27 into 4 subnetworks, we will use /26 Network instead of /27 Network.
     + So, we will get 2 subnet bit which provides 2^2 = **4 Subnets**
     + New Subnet : **255.255.255.192**
   * 256 – 192 = 64 → **Range of IPs**
   * 2^6 = 64 – 2 = 62 → **Hosts per Subnetwork**

**Question 2:**Consider the 128.100.112.0/21 block of IP addresses. This block of addresses must be divided into four subnetworks that have each at least 500 IP addresses.

**Solution:**

**Given IP:** 128.100.112.0/21

**Subnet Mask:** 255.255.255.192 (11111111.11111111.11111110.00000000)

* We need 500 host per subnet we can use 23 network bits, it will give us 2^9 = **512 host each network**
* Now, new **Subnet Mask will be 255.255.254.0**
* Now, we have 7 subnet bits in the 3rd octet
  + 2^7 = **128 Sub networks**
  + 256-254 = 2
  + start of ips = 0,2,4,6,8,10,…..
* **IP Addresses of the subnetworks:**
  + 128.100.0.0 – 128.100.1.255
  + ...
  + 128.100.112.0/23 – 128.100.113.255/23
  + 128.100.114.0 – 128.100.115.255
  + 128.100.116.0 – 128.100.117.255
  + 128.100.118.0 – 128.100.119.255
  + ...
  + 128.100.254.0 – 128.100.255.255

**Question 3:**An organization is assigned a class C network address of 201.35.2.0. It uses a netmask of 255.255.255.192. Using this netmaska) How many subnets can be created. What are the address of the assigned subnetworks?b) In each subnet, how many IPs each subnet will have

**Solution:**

**Given IP:** 201.35.2.0

**Subnet Mask:** 255.255.255.192 (11111111.11111111.11111111.11000000)

1. **Number of Subnets:**
   * Subnet Bits: 2
   * 2^2 = **4 Subnets**
   * **Addresses of sub networks:**
     + 201.35.2.0
     + 201.35.2.64
     + 201.35.2.128
     + 201.35.2.192
2. **Ips each subnet will have:**
   * Number of host bits = 6
   * 2^6 = 64 – 2 = 62
   * **62 Usable IP per subnet**

**Question 4:**  
An organization is assigned a class C network address of 201.35.2.0. It uses a netmask of 255.255.255.192 to divide this into sub-networks. Which of the following is/are valid host IP addresses?  
A) 201.35.2.63  
B) 201.35.2.200  
C) 201.35.2.255  
Both ( A ) and ( C )

**Solution:**

**Given IP:** 201.35.2.0

**Subnet Mask:** 255.255.255.192 (11111111.11111111.11111111.11000000)

256-192 = 64 → Range

network ip starting range:

* 0 – 63
* 64 -127
* 128 - 191
* 192 – 255

**Answer is B** because that is the only ip rely in between Host Addresses, because first address is network address, and last address is broadcast address.

**Question 5:**  
An organization has a class C network address of 201.32.64.0. It uses a subnet mask of 255.255.255.248. Which of the following is NOT a valid broadcast address for any subnetworks?  
a) 201.32.64.135  
b) 201.32.64.240  
c) 201.32.64.207  
d) 201.32.64.231

**Solution:**

**Given IP:** 201.35.64.0

**Subnet Mask:** 255.255.255.248 (11111111.11111111.11111111.11111000)

256-248 = 8 → Range

network ip starting range:

* 0 – 7
* 8 – 15
* ….
* 128-135 → valid
* 200-207 → valid
* ...

**Answer is B** because that is the only Broadcast address that is in the **even value , and all the broadcast addresses are in odd value.** As we know first address is network address, and last address is broadcast address.