CCST Networking – Module 6 Quiz

Questions

1. You apply a 28-bit subnet mask to the 192.168.0.0 network. That results in the creation of how many subnets?

    a. 8
    b. 16
    c. 32
    d. 64

2. You need to subnet the 172.30.0.0 network to support a minimum of 87 host IP addresses per subnet, while maximizing the number of available subnets. What subnet mask will you select?

    a. /21
    b. /23
    c. /25
    d. /27

3. While troubleshooting a PC, you notice its IP address is 203.0.113.70 with a subnet mask of 255.255.255.224. To what subnet does that PC belong?

    a. 203.0.113.32 /27
    b. 203.0.113.64 /28
    c. 203.0.113.32 /28
    d. 203.0.113.64 /27

4. What is the directed broadcast address of the network on which an IP address of 192.168.1.100 /26 resides?

    a. 192.168.255.255
    b. 192.168.1.191
    c. 192.168.1.255
    d. 192.168.1.127

5. You need to assign IP addresses to devices on the 192.0.2.128 /26 subnet. What is the assignable IP address range?

    a. 192.0.2.129 – 192.0.2.191
    b. 192.0.2.129 – 192.0.2.159
    c. 192.0.2.129 – 192.0.2.190
    d. 192.0.2.129 – 192.0.2.158

Questions and Answers

1. You apply a 28-bit subnet mask to the 192.168.0.0 network. That results in the creation of how many subnets?

    a. 8
    b. 16
    c. 32
    d. 64

    Answer: b

    Explanation: The 192.168.0.0 network is a Class C network, because there is a 192 in the first octet. A Class C network has a default subnet mask of /24. Since a /28 subnet mask is applied in this example, we have 4 borrowed bits (i.e., 28 – 24 = 4).

    We can calculate the number of created subnets with the formula:

    Number of Subnets = 2^s, where "s" is the number of borrowed bits.

    In this instance, 2^4 = 16. Therefore, 16 subnets are created.

    Video Reference: Calculating Available Subnets

2. You need to subnet the 172.30.0.0 network to support a minimum of 87 host IP addresses per subnet, while maximizing the number of available subnets. What subnet mask will you select?

    a. /21
    b. /23
    c. /25
    d. /27

    Answer: c

    Explanation: The number of assignable IP addresses in a subnet can be calculated with the formula:

    Number of Assignable IP Address = 2^h – 2, where "h" is the number of host bits.

    We can write out a table showing how many assignable IP addresses (i.e., supported hosts) are available with a specific number of host bits.

Host Bits	Supported Hosts (2^h -2)
2	2
3	6
4	14
5	30
6	62
7	126

At this point, we see that 6 hosts bits are not enough However, 7 host bits will meet the objective of supporting 87 hosts. Therefore, we need 7 hosts bits, which gives us a subnet mask of /25 (i.e., 32 – 7 = 25).

Video Reference: Calculating Available Hosts

3. While troubleshooting a PC, you notice its IP address is 203.0.113.70 with a subnet mask of 255.255.255.224. To what subnet does that PC belong?

    a. 203.0.113.32 /27
    b. 203.0.113.64 /28
    c. 203.0.113.32 /28
    d. 203.0.113.64 /27

    Answer: d

    Explanation: First, we determine the interesting octet, which is the last octet in the subnet mask to contain a binary 1. In this case, the interesting octet is the 4th octet.

    Next, we calculate the block size, which is determined by subtracting the decimal value of the subnet mask's interesting octet from 256. In this case, the block size is 32 (i.e., 256 – 224 = 32).

    Now, to calculate the subnets, we count by the block size in the interesting octet, starting at 0:

    203.0.113.0
    203.0.113.32
    203.0.113.64
    203.0.113.96

    At this point, we can see that the IP address of 203.0.113.70 is between 203.0.113.64 and 203.0.113.96, and it's not the network address nor the directed broadcast address. So, it belongs to the 203.0.113.64 subnet.

The 255.255.255.224 is a 27-bit subnet mask (i.e., in the fourth octet, we have 3 bits (128 + 64 + 32 = 224), which we add on to the 24 bits in the first three octets).

Therefore, we can conclude that the IP address is part of the 203.0.113.64 /27 subnet.

Video Reference: Calculating Usable Ranges of IPv4 Addresses

4. What is the directed broadcast address of the network on which an IP address of 192.168.1.100 /26 resides?

    a. 192.168.255.255
    b. 192.168.1.191
    c. 192.168.1.255
    d. 192.168.1.127

Answer: d

Explanation: First, we determine the interesting octet, which is the last octet in the subnet mask to contain a binary 1. In this case, the interesting octet is the 4th octet.

Next, we calculate the block size, which is determined by subtracting the decimal value of the subnet mask's interesting octet from 256. Writing a /26 subnet mask in dotted decimal gives us: 255.255.255.192 (i.e., 128 + 64 = 192). In this case, the block size is 64 (i.e., 256 – 192 = 64).

Now, to calculate the subnets, we count by the block size in the interesting octet, starting at 0:

192.168.1.0
192.168.1.64
192.168.1.128
192.168.1.192

At this point, we can see that the IP address of 192.168.1.100 is between 192.168.1.64 and 192.168.1.128 and it's not the network address nor the directed broadcast address. So, it belongs to the 192.168.1.64 subnet.

If we write the subnet's 4th octet in binary, we get: 01000000 where the last 6 bits are host bits. To calculate the directed broadcast address, we set the last 6 bits to 1s, giving us: 01111111, which equals 127 in decimal.

Therefore, the directed broadcast address of the network on which 192.168.1.100 /26 resides is 192.168.1.127.

Alternately, we could have subtracted 1 from the 4th octet of the next subnet to get the same result (i.e., 192.168.1.128 – 1 = 192.168.1.127).

Video Reference: The Need for Subnetting

5. You need to assign IP addresses to devices on the 192.0.2.128 /26 subnet. What is the assignable IP address range?

    a. 192.0.2.129 – 192.0.2.191
    b. 192.0.2.129 – 192.0.2.159
    c. 192.0.2.129 – 192.0.2.190
    d. 192.0.2.129 – 192.0.2.158

    Answer: c

    Explanation: First, we determine the interesting octet, which is the last octet in the subnet mask to contain a binary 1. In this case, the interesting octet is the 4th octet.

    Next, we calculate the block size, which is determined by subtracting the decimal value of the subnet mask's interesting octet from 256. Writing a /26 subnet mask in dotted decimal gives us: 255.255.255.192 (i.e., 128 + 64 = 192). In this case, the block size is 64 (i.e., 256 – 192 = 64).

    Now, to calculate the subnets, we count by the block size in the interesting octet, starting at 0:

    192.0.2.0
    192.0.2.64
    192.0.2.128
    192.0.2.192

    We know that we cannot assign the network address (192.0.2.128) to a host. Similarly, we cannot assign the directed broadcast address to a host.

    In this case, we can quickly calculate the directed broadcast address by subtracting 1 from the 4th octet of the next subnet (192.0.2.192 – 1 = 192.0.2.191).

    We are allowed to assign IP addresses using addresses between 192.0.2.128 and 192.0.2.191, which gives us an assignable IP address range of: 192.0.2.129 – 192.0.2.190.

    Video Reference: Calculating Usable Ranges of IPv4 Addresses