1. Explain the concept of dotted decimal notation in addressing.

Dotted decimal notation is a common way of representing IP (Internet Protocol) addresses, which are unique identifiers for devices connected to a network. In dotted decimal notation, the IP address is represented as a series of four decimal numbers, each separated by a period (or dot).

Each decimal number in the address represents an eight-bit binary number, also known as an octet, which can have a value between 0 and 255. The decimal numbers are converted from their binary representation to their decimal equivalent, and then written out in the dotted decimal notation.

For example, the IP address 192.168.1.1 is written in dotted decimal notation. To convert this address from binary to decimal, we start by breaking it into four octets:

- 192 (binary: 11000000)
- 168 (binary: 10101000)
- 1 (binary: 00000001)
- 1 (binary: 00000001)

Each octet is then converted to its decimal equivalent, resulting in the dotted decimal notation 192.168.1.1.

Dotted decimal notation is commonly used because it is easier for people to remember and read than binary notation. It is also easier to manipulate and work with than binary notation, particularly for subnetting and network routing purposes.

2. A block of IP addresses is granted to ECE department of SRM university. One of the IP addresses in the block is 205.16.32.36/29. Find the first address, last address and number of addresses in the block?

The IP address 205.16.32.36/29 represents a block of IP addresses with a subnet mask of 255.255.255.248. This block contains 8 IP addresses, which can be calculated as follows:

2^3 = 8

The /29 notation indicates that the first 29 bits of the IP address are used to define the network portion of the address, leaving the remaining 3 bits to be used for host addresses.

To find the first address in the block, we take the given IP address and set all the host bits to zero:

205.16.32.36 = 11001101.00010000.00100000.00100100 subnet mask = 11111111.11111111.11111111.11111000 first address = 11001101.00010000.00100000.00100100 (unchanged)

The first address in the block is therefore 205.16.32.36.

To find the last address in the block, we set all the host bits to one:

205.16.32.36 = 11001101.00010000.00100000.00100100 subnet mask = 11111111.11111111.11111111.11111000 host bits = 00000000.00000000.00000000.00000111 last address = 11001101.00010000.00100000.00101000

The last address in the block is therefore 205.16.32.43.

So the first address in the block is 205.16.32.36, the last address is 205.16.32.43, and the total number of addresses in the block is 8.

3. An analog signal has a bit rate of 4000 bps and band rate of 500 baud. How many data elements are carried by each signal element? How many signal elements do we need?

In analog communication, the bit rate (Rb) and baud rate (S or N) are related as:

Rb = S x log2 L

where L is the number of data elements carried by each signal element. Solving for L, we get:

L = 2^(Rb/S)

Substituting the given values, we get:

L = 2^(4000/500) = 2^8 = 256

Therefore, each signal element carries 256 data elements.

To calculate the number of signal elements required, we can use the formula:

N = Rb/S

Substituting the given values, we get:

N = 4000/500 = 8

Therefore, we need 8 signal elements to transmit the analog signal.

3. Determine the error in the following IPv4 addresses. (i)103.57.040.71,(ii)220.130.9.3.2, (iii)65.33.399.10, (iv)11100011.14.14.63

(i) The error in this IPv4 address is the leading zero in the third octet. Octets in IPv4 addresses are represented in decimal form and leading zeros are not allowed. The correct representation of this address is 103.57.40.71.

(ii) The error in this IPv4 address is the presence of an extra octet. IPv4 addresses have only four octets separated by periods. The correct representation of this address is 220.130.9.32.

(iii) The error in this IPv4 address is the value 399 in the third octet. The valid range for each octet in an IPv4 address is 0 to 255. The correct representation of this address is 65.33.255.10.

(iv) The error in this IPv4 address is the use of binary notation instead of decimal notation. IPv4 addresses are represented in decimal notation, with each octet having a value between 0 and 255. The correct representation of this address in decimal notation would be 227.14.14.63.

4. Write the differences between Unicast addressing mode and Broad cast addressing mode in IPV4.

Feature	Unicast Addressing Mode	Broadcast Addressing Mode
Destination address	Unique address of the receiving device	Special address representing all devices on the network
Delivery	Delivered to a single host	Delivered to all hosts on the network
Intended recipients	Intended for one host alone	Intended for all hosts to receive
Communication type	One-to-one communication	One-to-all communication
Usage	Typically used for client-server communication	Typically used for network discovery or sending updates to all devices on a network

In summary, Unicast addressing mode is used for one-to-one communication while Broadcast addressing mode is used for one-to-all communication

5. A signal constitute of 1000 Hz, 1800 Hz, and 2000 Hz frequencies. Determine the minimum sample rate required to find this information?

Not sure about this one. Check and let me know

According to the Nyquist-Shannon sampling theorem, the minimum sampling rate required to accurately reconstruct a signal is twice the highest frequency component in the signal.

In this case, the highest frequency component in the signal is 2000 Hz. Therefore, the minimum sample rate required to accurately capture this signal is:

2 x 2000 Hz = 4000 Hz

So, the minimum sample rate required is 4000 Hz.

6. **Mention the special classes and summarize the block of IP addresses allocated for local area networking for each class.**

In IPv4, there are three special classes of IP addresses that have been reserved for specific purposes. These are:

1. Class A Special Addresses: This class includes 3 special IP addresses, which are reserved for specific purposes. These are:
   - 127.0.0.1: This is known as the loopback address and is used by a host to send packets to itself.
   - 0.0.0.0: This address is used to indicate an invalid, unknown, or uninitialized target.
   - 255.255.255.255: This is the broadcast address used to send a packet to all devices on a network segment.
2. Class B Special Addresses: This class includes a range of IP addresses (169.254.0.0 - 169.254.255.255), which are reserved for Automatic Private IP Addressing (APIPA). These addresses are used by hosts when a DHCP server is not available to assign an IP address.
3. Class C Special Addresses: This class includes a range of IP addresses (192.168.0.0 - 192.168.255.255), which are reserved for private network addressing. These addresses can be used by organizations to create their own private networks without needing to request IP addresses from an Internet Service Provider (ISP).

In summary, Class A Special Addresses include three reserved addresses, Class B Special Addresses are reserved for Automatic Private IP Addressing (APIPA), and Class C Special Addresses are reserved for private network addressing.

7. An analog signal has a bit rate of 4000bps and baud rate of 500 baud.How many data elements can be carried by the signal element?How many signal elements do we need?

In analog communications, the relationship between bit rate and baud rate is given by:

bit rate = baud rate x log2(S),

where S is the number of data elements carried by each signal element.

In this case, we have a bit rate of 4000 bps and a baud rate of 500 baud. So we can rearrange the equation above to solve for S:

S = 2^(bit rate/baud rate)

Plugging in the values, we get:

S = 2^(4000/500) = 2^8 = 256

Therefore, each signal element can carry 256 data elements.

To determine the number of signal elements needed, we divide the bit rate by the baud rate:

number of signal elements = bit rate / baud rate = 4000 / 500 = 8

Therefore, we need 8 signal elements to transmit the 4000 bps signal with a baud rate of 500.

8. You have an available bandwidth of 100KHz which spans from 200 to 300KHz.What are the carrier frequency and bit rate if ASK with d=1 is used for modulation?

In Amplitude Shift Keying (ASK), the carrier signal is switched on or off to represent binary 1 or 0 respectively. The bit rate is the number of bits transmitted per second and can be calculated as:

bit rate = 2 x bandwidth x log2(M)

where M is the number of different signal levels that can be used for modulation. In this case, since d=1 (i.e., binary 1 or 0), M=2.

Therefore, the bit rate can be calculated as:

bit rate = 2 x 100 kHz x log2(2) = 200 kbps

The carrier frequency, which is the center frequency of the available bandwidth, can be calculated as:

carrier frequency = (200 kHz + 300 kHz) / 2 = 250 kHz

Therefore, if ASK with d=1 is used for modulation, the carrier frequency is 250 kHz and the bit rate is 200 kbps.