1 A] Given an IP address and network mask, determine other information about the IP address such as:
• Network address
• Network broadcast address
• Total number of host bits
• Number of hosts

IP address : 200.11.8.45

Step 1 : convert the given address in binary

200	11	8	45
11001000	00001011	00001000	00101101

Step 2 : find the class of the given address

Class C -> because first byte (200) is between 192 – 223.

Step 3: Find No. of address in the block

Host byte = 1 byte = 8 bits

No. of address in the block => 2^8 = 256

Step 4 : find subnet mask

Class C : 255.255.255.0

Step 5 : Find first address in the block

200	11	8	0
11001000	00001011	00001000	00000000

200.11.8.0 => first address => Network address

200.11.8.1 => first host address

Step 6: Find last address in the block

200.11.8.255 => last address => Broadcast address

200.11.8.254 => last host address

Step 7 : Find no. of host address in the block

No. of host address = Total no of address in the block – network address – broadcast address

No. of host address = 2^8 – 1 – 1

=256 - 1 – 1   or 256 - 2

No. of host address =254

2) Given IP address : 167.199.170.82

CLASS : B

No of host bits = 16

No of address = 2^16 = 65536

No of host address = 65536 – 2 = 65534

First host address => 167.199.0.1

Network address => 167.199.0.0

Broadcast address => 167.199.255.255

Last host => 167.199.255.254

Subnet mask : 255.255.0.0

3) Given IP address : 10.20.200.40

Step 1 : convert in binary

10	20	200	40
00001010	00010100	11001000	00101000

Class A => 10 between 0 to 127

No of host bits : 2 4

NETWORK ADDRESS : 10.0.0.0

FIRST HOST ADDRESS : 10.0.0.1

BROADCAST ADDRESS : 10.255.255.255

LAST HOST ADDRESS : 10.255.255.254

NO OF HOST ADDRESS : $2^{24} - 2$

SUBNET MASK : 255.0.0.0

1 B] Classless Address

IP : 167.199.170.82 / 27

After '/' notation => number represents no. of network bits.

Step 1 : convert in binary

167	199	170	82
10100111	11000111	10101010	01010010

1 0 1 0 0 1 1 1 1 1 0 0 0 1 1 1 1 0 1 0 1 0 1 0 0 1 0|1 0 0 1 0

N e t w o r k   b i t s   h o s t   b i t s

No of host bits : 32 − 27 = 5

No. of Host address: 2^5 − 2 = 32 − 2 = 30

First host address => 1 0 1 0 0 1 1 1 1 1 0 0 0 1 1 1 1 0 1 0 1 0 1 0 0 1 0 0 0 0 0 1

=>167.199.170.65 / 27

Network address = 167.199.170.64 / 27

broadcast host => 1 0 1 0 0 1 1 1 1 1 0 0 0 1 1 1 1 0 1 0 1 0 1 0 0 1 0 1 1 1 1 1

⇨ 167.199.170.95/