

## Assignment-2

Summer 24-B

1) Given,

IPv4 : 137.168.210.108

Subnet Mask : 255.255.240.0

Default gateway : 137.168.211.10

i) Here, prefix length = /20.

So, Host bits =  $32 - 20 = 12$

No. of hosts =  $2^{12} - 2 = 4096 - 2 = 4094$  hosts (Ans.)

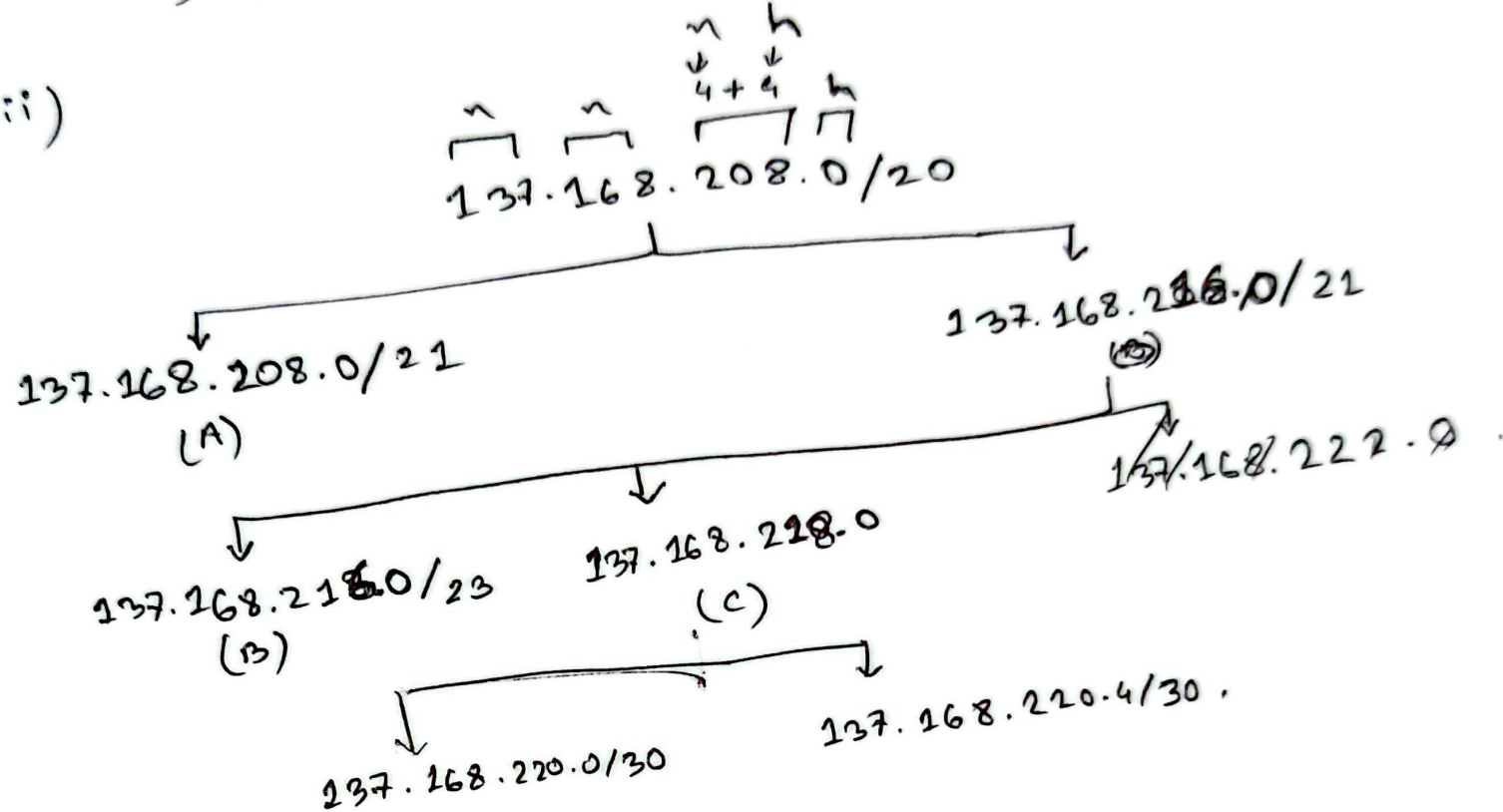
ii) IP = 10001001 1010 1000 1101 0010 0110 1100  
 Subnet = 111 111 11 1111 1111 111 10000 0000 0000  
 mask

∴ Network address = 137.168.208.0/20.

i)

Name	Host	Host+2	Block size	Host bits	Prefix	Waste
A	2000	2002	2048	11	21	46
B	480	482	512	9	23	30
C	350	352	512	9	23	160
D(WAN)	2	4	4	2	30	0
E(WAN)	2	4	4	2	30	0
						Total = 236.

1) iii)



128	64	32	16	8	4	2	1	
1	1	0	1	0	0	0	0	→ 208.0 (A)
1	1	0	1	1	0	0	0	→ 216.0 (B)
1	1	0	1	1	0	1	0	→ 218.0 (C)
1	1	0	1	1	1	0	0	→ 220.0 (D)
1	1	0	1	1	1	1	0	→ 222.0

2) i) The ISP router uses PAT, which changes the source port number for each internal device. When a reply comes back, the router checks the destination number and forwards the packet to the correct device.

ii) Device A and B uses Private IP addresses. ISP router uses Public IP address. Private ~~at~~ IP is not routable on internet but Public IP is globally routable. Private IP can be reused and Public IP must be unique.

3) i) Maximum data per fragment =  $830 - 30 = 800$  bytes.

No. of fragments =  $\frac{8240}{800} = 10.3 \approx 11$  fragments (Ans.)

ii) Data sent by first 10 fragments =  $800 \times 10 = 8000$  bytes.

Remaining data =  $8240 - 8000 = 240$  bytes. (Ans.)

iii) Data before 7<sup>th</sup> fragment =  $800 \times 6 = 4800$  bytes.

Fragment offset = 8 bytes

" of 7<sup>th</sup> fragment =  $\frac{4800}{8} = 600$  (Ans.)

iv) If DF bit is turned on then Router cannot fragment and the packet is dropped. It has to be fragmented from the sender side.

4) i) 2001:db8::0001:0:100:0

Expanded: 2001:db8:0000:0000:0001:0000:0100:0000

ii) 0:1::

Expanded: 0000:0001:0000:0000:0000:0000:0000:0000

iii) 2002:c6::db80:0:0

Expanded: 2002:00c6:0000:0000:0000:0000:db80:0000

5) i) Here, the command uses only next-hop IP, which causes recursive lookup. Improved version -

ip route 172.31.10.0 255.255.255.0 50/0/0.

ii) For configuring default static routes it should be done in a router which has only one exit path, reduces routing table size and also improves efficiency.

6) i) Switches will forward it to other ports (flood).  
Routers will drop the frame.

ii) S<sub>1</sub>

D	f <sub>2</sub>
A	f <sub>0</sub>

S<sub>2</sub>

A	f <sub>2</sub>
D	f <sub>1</sub>

7) Hop Limit prevents packets from looping forever. Decreases in every loop hop and packet gets discarded when it reaches zero. In IPV4 the same function field is TTL.

8) We call Link State Routing protocol a global routing protocol because Routers know the entire network topology. Each router has a complete map. It is more efficient than Distance Vector Routing because it can converge faster, no routing loops and event-based updates.

9) i) The issue is DHCP uses broadcast but Routers block broadcasts. The solution can be -  
`ip helper-address <DHCP-server-IP>`

ii) Message exchanged between PC and a DHCP server for renewal of leased IP are DHCPREQUEST and DHCPACK.



10) i)  $98:CC:12:23:40:BB$ .

First byte =  $98 \rightarrow$  its binary ends with 0.

So, it is an unicast address.

ii) MAC address of a packet changes every hop because MAC is link-local but IP donot change because it is end to end. Each hop rewrites MAC header.

11) Device sends ARP for default gateway at first. Then gets gateway IP from Manual configuration or DHCP server.