Solution : 1

(i)

Subnet mask : **255.255.128.0**

(ii)

Network address : **107.168.128.0/17**

(iii)

Network	Hosts needed	Hosts available	Num. of host bits	Prefix	
LAN A	2502	4096	12	/20	16 (3rd octate)
LAN B	1202	2048	11	/21	8 (3rd octate)
LAN C	1052	2048	11	/21	8 (3rd octate)
WAN 1	4	4	2	/30	4 (4th octate)
WAN 2	4	4	2	/30	4 (4th octate)

Network address of LAN A : 107.168.128.0/20

" " " " B : 107.168.144.0/21

" " " " C : 107.168.152.0/30

" " " WAN 1 : 107.168.160.0/30

" " " WAN 2 : 107.168.160.4/30

Solution : 2

(i)

By using PAT, the router assigns a unique source port for each internal device. This information is saved in a PAT table. So, when the game server sends any reply, the ISP Router checks the PAT table and monitors which internal IP and port match that destination port and forwards the reply to that device.

(ii)

Device A and B uses **Private IPv4 Address** which are not routable on the internet. That's why the ISP router sets a PAT address to make these devices routable on the internet while hiding their real IP address.

Solution : 3

(i)

Data = 7240 − 40 = 7200 bytes

Router's capability = 800 bytes at a time

∴ " " = (800 − 40)

= 760 bytes of data at a time

∴ Number of fragments = $\frac{7200}{760}$ = 9.47 ≈ **10**

(ii)

Data carried by the full 9 fragments

$= 9 \times 760 = 6840$ bytes

$\therefore$ Remaining data $= 7200 - 6840$

$= 360$ bytes

$\therefore$ Last fragment size $= 360 + 40$

$= \boxed{400 \text{ bytes}}$

(iii)

Fragment offset of the 8th fragment

$= \frac{7 \times 760}{8} = \boxed{665}$

(iv)

When MF = 0 it means that there are no fragments left after it. That's why the MF bit is zero for the last fragment.

Solution: 4

(i) 2001 : db8 : : 1 : 0 : 0 : 100

(ii) ff02 : : 1

(iii) 2001 : 0 : 0 : 3c10 : :

Solution: 5

(i)

Since there is no exit ~~port~~ interface mentioned in the given command, it will force R1 to search for 10.10.10.2 recursively ~~wit~~ which is unnecessary. Hence, the ~~imp~~. command can be improved like below:

ip route 172.31.10.0 255.255.255.0 s1/0 10.10.10.2

Solution : 6

(i)

The intermediary devices which will receive and forward the ARP request are :

S2, S1 and S3

(ii)

MAC address table for S2 :

MAC	Interface	TTL
E	f1	60
A	f2	60

for S3 :

MAC	Interface	TTL
E	f1	60
A	f2	60

Solution : 7

Flow Label is the field that has been added in the IPv6 header. This 20-bit field is added to mark packets that belong to the same traffic flow between a source and a destination.

Solution : 8

Distance Vector routing protocol is a decentralized protocol because it only operates to the next-hop neighbour and depends on the distance to a destination.

Differences between DV routing protocol and Link State routing protocol are :

DV	LS
(i) Only has the partial view of the network.	(i) Has the full view of the network.
(ii) Uses Bellman-Ford algorithm.	(ii) Uses Dijkstra's algorithm.
(iii) Needs low CPU and memory.	(iii) Requires higher CPU and memory.

Solution : 10

(i)

The OUI part : AF : CC : FE

(ii)

A MAC address is considered a flat address because (a) It has no location information.

(b) It cannot be aggregated for routing.

(c) It remains the same in different networks.