Q-1

2.	a)	Suppose an organization has four departments to manage. These are sales and purchase department with 128 computers, development department with 60 computers, accounts department with 16 computers and management department with 4 computers. If the network administrator has IP 172.160.0.0, identify the Network Address, Broadcast Address, Usable IP range and subnet mask for each department.

Ans:

IP **172.160.0.0**.

Network Address, Broadcast Address, Usable IP range, and Subnet Mask for each department based on their computer requirements.

Steps:

IP Allocation: The number of IPs required for each department is based on their number of computers, plus some extra for network and broadcast addresses.

- ○ **Sales and Purchase**:

  128 computers → Nearest power of 2 = 128 IPs (2^7)

- ○ **Development**:

  60 computers → Nearest power of 2 = 64 IPs (2^6)

- ○ **Accounts**:

  16 computers → Nearest power of 2 = 16 IPs (2^4)

- ○ **Management**:

  4 computers → Nearest power of 2 = 4 IPs (2^2)
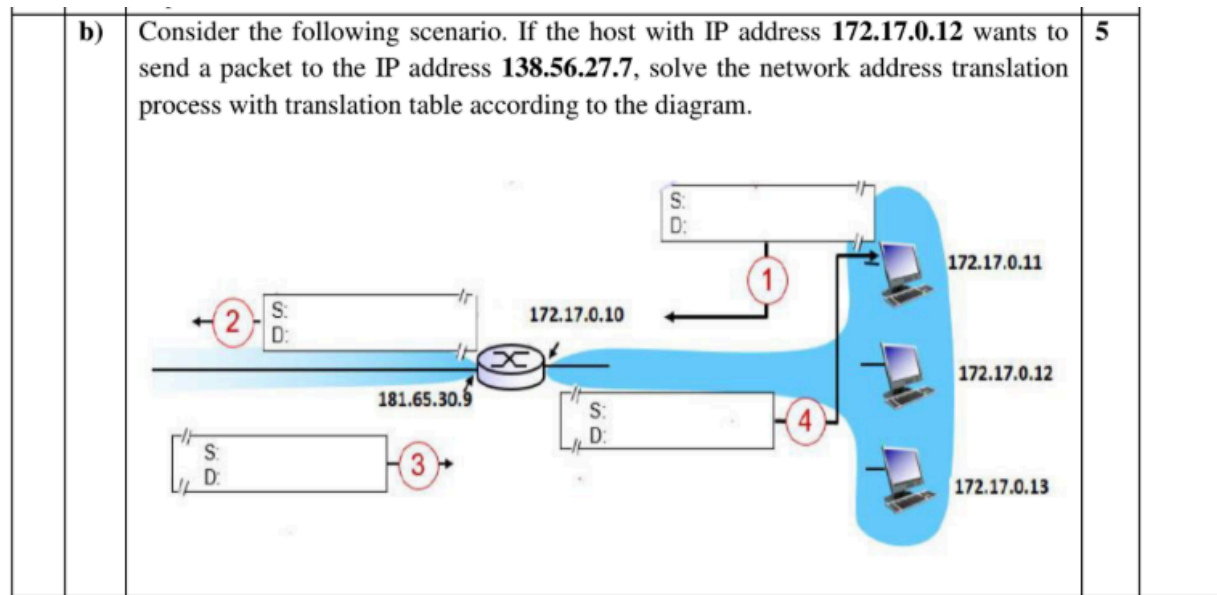
Subnet Mask Calculation:

- ○ Sales and Purchase: /25 (Subnet mask = 255.255.255.128)
- ○ Development: /26 (Subnet mask = 255.255.255.192)
- ○ Accounts: /28 (Subnet mask = 255.255.255.240)
- ○ Management: /30 (Subnet mask = 255.255.255.252)

Subnet Allocation:

- ○ Start with **172.160.0.0** and allocate subnets sequentially.

Department	Network Address	Broadcast Address	Usable IP Range	Subnet Mask
Sales and Purchase	172.160.0.0	172.160.0.127	172.160.0.1- 172.160.0.126	255.255.255.128 (/25)
Development	172.160.0.128	172.160.0.191	172.160.0.129- 172.160.0.190	255.255.255.192 (/26)
Accounts	172.160.0.192	172.160.0.207	172.160.0.193- 172.160.0.206	255.255.255.240 (/28)
Management	172.160.0.208	172.160.0.211	172.160.0.209- 172.160.0.210	255.255.255.252 (/30)

Q-2

| b) | Consider the following scenario. If the host with IP address **172.17.0.12** wants to send a packet to the IP address **138.56.27.7**, solve the network address translation process with translation table according to the diagram. | 5 |

Ans:

Source NAT (SNAT):

- **Original Source**: 172.17.0.12 (private IP)
- **Translated Source**: Public IP of the router (181.65.30.9)

Update NAT table entry:

Private IP	Translated Public IP
172.17.0.12	181.65.30.9

Destination Address:

- The original destination **138.56.27.7** remains unchanged as it's a public IP.

Return Path (DNAT):
- When the destination replies, it sends the packet back to **181.65.30.9** (translated public IP).
- The NAT router maps it back to the original private IP **172.17.0.12**.

Translation Table:

Step	Source Address	Destination Address	Translation
1	172.17.0.12	138.56.27.7	Source translated to 181.65.30.9
2	138.56.27.7	181.65.30.9	Destination translated to 172.17.0.12