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Q1. Explain the functions of the all layers of OSI model with their protocol. (with diagram).

Q2. Describe network operating system in detail.

Q3. Difference between LAN MAN and WAN. (including diagram)

Q4. Define following term: 1. Physical address 2. Logical address 3. Port address 4. Access point.

Q5. Define following term 1. Define computer network with its advantages and disadvantages. 2. Describe NIC with its features 3. Concept of data encapsulation

Q6. Describe the construction of Fiber optic cable and coaxial with a neat diagram.

Q7. Explain following topology in detail with its advantages, disadvantage and diagram 1. Ring topology 2. Mesh topology 3. Start topology 4. Hybrid topology

Q8. Compare IPv4 & IPv6 address (8 points).

Q9. State the internet layer protocols in TCP/IP suite. Explain the function of ARP and ICMP.

Q10. Explain the working of subnetting and supernetting with diagram and example.

Q11. Explain working of following term with its function, advantages, disadvantages and diagram. 1. ARP 2. RARP 3. FTP 4. HTTP 5. DHCP configuration

Q12. Describe the classification of networks based on transmission technology.

Q13. Describe working of DNS and SMTP protocols with suitable example.

Q14. Compare between OSI and TCP/IP model (any 8 points).

Q15. Write a procedure for the following with its advantages and disadvantages:
1. To share a file 2. To share printer in network (device)

Q16. Describe the Host-to-Network layer protocols SLIP and PPP.

Q17. Draw the neat labelled diagram of Repeater. State the situation under which repeater is necessary in Networks

Q18. Comparison between HUB, Switch, Router, Bridge. (diagram). (8 points)

Q19. Define the following: (i) client (ii) server (iii) peer (iv) protocol

Q20. Draw IPv6 and IPv4 Frame Format. (message)

Q21. A small educational organization situated within a single building want to create a network to share the information of its 5 departments among them, for this network no centralized management is required, also no security is required. Which network is suitable for such organization? Justify
For a small educational organization with 5 departments situated in a single building and no centralized management or security requirements, a **peer-to-peer (P2P) network** is a suitable choice for sharing information among departments. Here's a brief explanation:
- **Decentralized Management**: A P2P network allows each computer (or node) to communicate directly with others without relying on a central server. This setup aligns with the organization's need for no centralized management.
- **Simplicity and Cost-Effectiveness**: P2P networks are easy to set up and maintain, making them suitable for small organizations with limited resources. They don't require specialized network infrastructure or dedicated servers, which keeps costs low.
- **Flexibility**: In a P2P network, each computer can share information directly with others, providing flexibility in connectivity and resource sharing among departments.
- **No Security Requirements**: Since security isn't a priority for this organization, a P2P network can suffice for basic information sharing. However, it's essential to note that P2P networks typically lack robust security features compared to other architectures.

Q22. Draw a neat labelled sketch of hybrid topology connecting one star network of 4 computers, one ring network of 5 computers and one bus network of 5 computers.
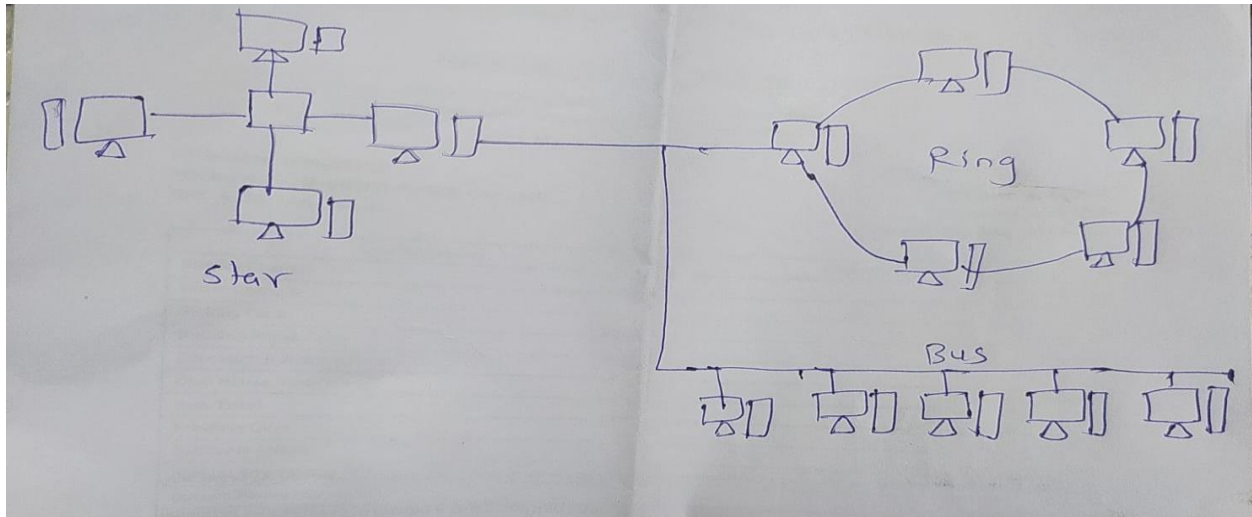
Q23. Identify class for following IP address and Justify it : (i) 10.145.14.68 (ii) 222.255.254.253 (iii) 191.168.0.1 (iv) 224.0.0.0
- (i) 10.145.14.68 is Class A
- (ii) 222.255.254.253 is Class C
- (iii) 191.168.0.1 is Class B
- (iv) 224.0.0.0 is a multicast address class D

Q24. Design a Class 'C' Network with network address 192.156.5.0 with 2 subnets. State the subnet mask and subnet address.

192.156.5.0/2
In Binary IP Address:
11000000   10011100   0000001   00000000
We will use class C address which takes 1 bit from Host field for
subnetting and leaves 7 bits for defining hosts. Having 7 bits available
for defining subnets means we have up to $2(2^1)$ different subnets.

8 bits	8 bits	8 bits	8 bits
N/W	N/W	N/W	N/W

7 bits

8 bits	8 bits	8 bits	1 bit	
N/W	N/W	N/W	Subnet	Host

Let's use IP address 192.156.5.0 with subnet mask 255.255.255.128

Step 1: convert to binary

192	156	5	0
11000000	10011100	00000101	00000000
255	255	255	128
11111111	11111111	11111111	100000000

Subnet Mask is: 255.255.255.128

Step 2: Calculate subnet address

To calculate the subnets IP address you need to perform bit wise
AND operation (1+1=1, 1+0=0   or   0+1=0, 0+0=0) on the host IP
address and subnet mask:

IP address:

```
        11000000     10011100    00000101    00000000
AND
        11111111     11111111    11111111    10000000
     _____
        11000000     10011100    00000101    00000000
```

Subnet Address is: 192.156.5.0

Q25. Draw a suitable network layout using Mesh topology to connect 8 computers. How many links are required. What are the advantages and disadvantages of this network ?

In a Mesh topology, the number of links required to connect n devices is calculated using the formula:
Number of links=n(n−1)2Number of links=2n(n−1)
For 8 computers:
Number of links=8(8−1)2=8×72=562=28Number of links=28(8−1)=28×7=256=28

Therefore, 28 links are required to connect 8 computers in a Mesh topology.

Advantages of Mesh Topology:
1. Fault Tolerance: Mesh topology offers high redundancy. If one link fails, there are alternative paths available between nodes, ensuring reliability and fault tolerance.
2. High Scalability: It's easy to scale a Mesh network by adding more devices without affecting the overall network performance.
3. Point-to-Point Communication: Each connection is point-to-point, allowing efficient data transfer and reducing congestion.

Disadvantages of Mesh Topology:

4

1. High Cost: Mesh networks require a large number of physical links, which can be costly to implement and maintain.
2. Complexity: As the number of devices increases, managing and configuring a Mesh network can become complex due to the large number of connections.
3. Resource Intensive: Setting up and maintaining a fully connected Mesh network can be resource-intensive in terms of hardware (cables, ports) and management (configuration, monitoring).
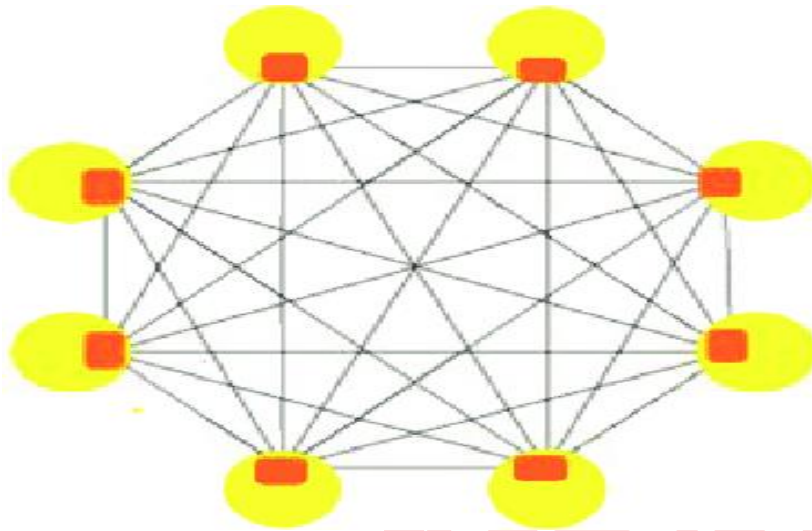
Instead if circle you draw computers (each computer connects to each other

Q26. Design suitable network layout for an organization with four departments (6 users each), shared print server, & network server.
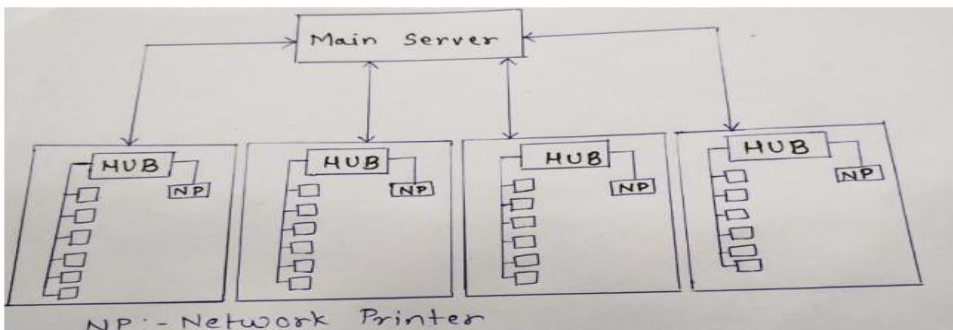
Q27. Elaborate the procedure to divide networks into subnets. Divide given network address in four equal part to hold maximum 50 devices in each subnet. IP address 192.168.14.14/25.

answer=➔

Step 1: Understand the Current Network and Subnet Mask

The IP address given is 192.168.14.14 with a subnet mask of /25.

This means the first 25 bits of the IP address are used for network identification, leaving 32 - 25 = 7 bits for host identification within the subnet.

Step 2: Determine Required Subnet Size

For 50 devices, you'll need at least 6 host bits (2^6 - 2 = 62 usable addresses, considering subnet and broadcast addresses).

Step 3: Determine New Subnet Mask To have 6 host bits per subnet (for ~62 addresses/subnet):

- The new subnet mask will be /25 (original) + 6 (additional bits) = /31

Step 4: Divide the Network

1. **Calculate New Subnet Mask**: The new subnet mask will be /31 (32 bits total: 25 network bits + 6 host bits)

2. **Calculate Subnet Size**:

- With a /31 subnet mask, each subnet will have $2^{(32 - 31)}$ = 2 IP addresses (1 for network ID, 1 for broadcast), but that's too small. The next step may involve trying a /30

Q28. Design a network with 15 host divided into 3 equal size sub-networks each with different network topology. i.e. bus, star and ring. Connect these subnetworks with suitable network device. Specify IP address to each subnetwork with its Broadcast and Network address.

List of available IP Address, Broadcast and Network Address: Name of Topology Network Address Broadcast Address: Usable Host Range BUS 192.168.14.0 192.168.14.63 192.168.14.1 - 192.168.14.5 RING 192.168.14.64 192.168.14.127 192.168.14.65 - 192.168.14.69 STAR 192.168.14.128 192.168.14.191 192.168.14.129 - 192.168.14.133
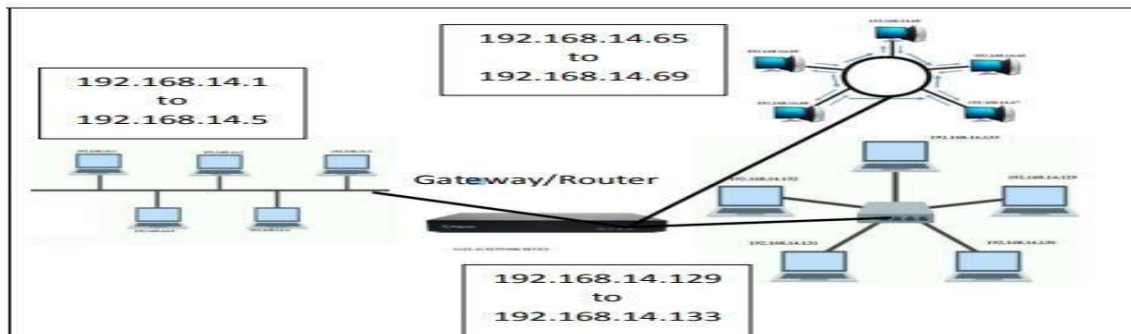
Q29. Give class & subnet address for following IP address : (i) 191.168.0.1 (ii) 221.45.14.68 (iii) 245.32.14.24 (iv) 10.145.14.68

Sr. No.	IP Address	Class	Subnet address
1	191.168.0.1	Class B	191.168.0.0
2	221.45.14.68	Class C	221.45.14.0
3	245.32.14.24	Class E	Reserved
4	10.145.14.68	Class A	10.0.0.0

Q30. Calculate broadcast address for the following: i) Network of class 'C' with network address 192.168.10.0 ii) Network of class 'B' with network address 172.16.20.0
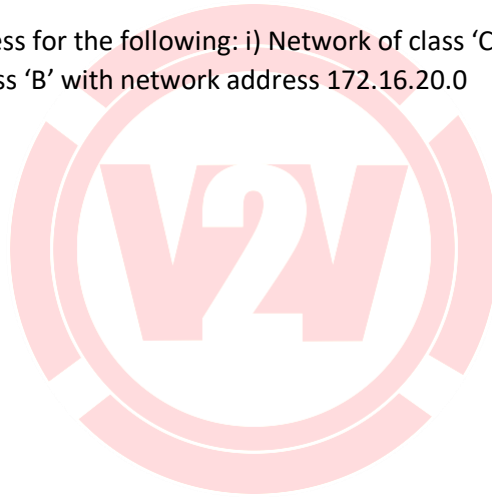
Network address: 192.168.10.0
Net mask: 255.255.255.0 = 24
Therefore, we can represent it as,
192.168.10.0/24
In Binary:
Network address   :   11000000.10101000.00001010.00000000
Subnet mask   :   11111111.11111111.11111111.00000000
Inverse Mask   :   00000000.00000000.00000000.11111111
Broadcast address   :   11000000.10101000.00001010.11111111
Broadcast address in decimal: 192.168.10.255
Network address: 172.16.20.0
Net mask: 255.255.0.0 = 16
Therefore, we can represent it as,
172.16.0.0/16
In Binary:
Network address   :   10101100.00010000.00010100.00000000
Subnet mask   :   11111111.11111111.00000000.00000000
Inverse Mask   :   00000000.00000000.11111111.11111111
Broadcast address   :   10101100.00010000.11111111.11111111
Broadcast address in decimal: 172.16.255.255

Q31. Draw Suitable network layout with star topology for a computer lab with 10 hosts and a wireless printer. List all components in the layout.