**17IT3503 – Computer Networks**

**Unit-3 Important Questions**

**One Mark Questions**

Define forwarding and routing (CO3)

Difference between forwarding and routing(CO3)

What is virtual circuit and datagram (CO3)

Difference between virtual circuit and datagram networks(CO3)

Define Subnet (CO3)

What is NAT ? Explain (CO3)

Give the classification of routing algorithms (CO3)

What is Count to infinity problem? (CO3)

What is NIC (CO3)

Explain the link layer services (CO3)

What is Checksum (CO3)

What are different Error detection techniques? Explain (CO3)

Define MAC Address(CO3)

Draw the Ethernet frame structure? (CO3)

**Essay Questions**

Analyse the process of forwarding and routing a packet(CO3)

Explain the phases for transmitting a packet through virtual circuit with an example (CO3)

Explain the phases for transmitting a packet through Datagram with an example (CO3)

Explain IP Datagram Fragmentation with Example (CO3)

Explain the process of Obtaining a Host Address through Dynamic Host Configuration Protocol

Consider the network shown below, with the indicated link costs. Use Dijkstra's shortest path algorithm to compute a table to find the shortest past from F to all network nodes(CO3)

****

Explain Distance vector routing algorithm with an example(CO3)

Consider the 7-bit generator, G=10011, and suppose that D has the value 1010101010. What is the value of R? Show the step by step evaluation (CO3)

Explain 2-bit parirt with an example(CO3)

Explain the working of ARP by taking an example network (CO3)

How to Send a Datagram off the Subnet. Explain(CO3)

**Placement Questions from Unit-3**

**Topic 1: Introduction: Forwarding and Routing in Network Layer**

1. Explain What Are Routers?

Answer: The process of routing is done by the devices known as Routers. Routers are the network layer devices.

2. What Is Routing Table?

Answer: A routing table stores the routes of the various nodes in a network. Nodes can be any electronic device connected to the network. The table is usually stored in a router or the network computer as a database or file. This information helps to find the best possible path. The routing table has at least 3 fields: the destination network id, cost of the path, next hop or address to send the packet.

**Topic 2: Virtual Circuit and Datagram Networks**

1. What are the major differences between virtual circuit and datagram networks?

Ans: Virtual Circuit is the connection oriented service in which there is a implementation of resources like buffers, CPU, bandwidth, etc., used by virtual circuit for a data transfer session. On other hand Datagram is the connection less service where no such resources are required for the data transmission.

2. What is the role of the address field in a packet Travelling through a datagram network and a virtual circuit network?

Ans: Role of the address field in a packet traveling through a datagram network isdefining end-to-end addressing.

3. Which is faster datagram or virtual circuit?

Ans : Virtual Circuit is less complex as compared to that of Datagram network. However on other hand Datagram network are more complex as compared to Virtual circuit. Due to fixed path and assurance of fixed resources, Virtual Circuits are more reliable for data transmission as compared to Datagram network.

**Topic 3: The Internet Protocol**

1. What Is Ipv4?

Answer :IPv4 stands for Internet Protocol version 4. It is the fundamental technology that makes it possible for us to connect our devices to the Internet. Whenever a device accesses the Internet it is assigned a unique, numerical IP address such as 128.255.244.221. To send data from one computer to another through the Internet, a data packet must be transferred across the network containing the IP addresses of both the sender and the receiver. Without IP addresses it is not possible for devices to communicate with each other. It is fundamental to the existence of the Internet.

2. Why Are We Running Out Of Ipv4 Addresses?

Answer :IPv4 uses 32 bits to address computers on the Internet. That means it can support 2^32 IP addresses in total -- around 4.29 billion. In the 1980’s a 4 billion computers on the Internet seemed like impossibility. Surprisingly, almost all 4.29 billion IP addresses have now been assigned to various institutions, leading to the crisis we face today. We have not totally run out of these addresses but with the growing population and the ever increasing number of devices that connect to the Internet, the day when we shall completely exhaust these addresses is very near. Hence the need to shift to a system that offers a larger addresses space.

3. What Is The Prefix Notation Of Ipv4?

Answer :Prefix Notation : 192.149.0.0/24

4. Is It Possible To Have An Ipv4 And An Ipv6 Addresses Simultaneously?

Answer :Yes. Most of the operative systems that currently support IPv6 allow the simultaneous use of both protocols. This way, the communication with IPv4 only networks as well as IPv6 only networks is possible, and the use of the applications designed for both protocols

5. What Is The Difference Between Ipv4 And Ipv6?

Answer :The Internet Protocol version 4 (IPv4) is a protocol for use on packet-switched Link Layer networks (e.g. Ethernet). IPv4 provides an addressing capability of approximately 4.3 billion addresses. The Internet Protocol version 6 (IPv6) is more advanced and has better features compared to IPv4.

6. How many subnets and maximum hosts per subnet can we get from the subnet network 172.27.0.0/23?

Ans: Subnets: 128, Maximum Hosts / Subnet: 510

Explanation: IP Address: 172.27.0.0 is from Class ‘B’ that is default network bits are 16 and Host bits are 16.

For /23, Borrow bits will be: 23 – 16 = 7

Hence, Number of Subnets = 27 = 128

For /23, Host bits will be: 32 – 23 = 9

Hence, Maximum Hosts in each Subnet = 2H – 2

= 29 – 2 = 512 – 2 = 510

7. You have a class ‘C’ network that needs 28 subnets while maximizing the number of valid host addresses available on each subnet. How many bits need to borrow from the host field to provide the correct combination, what will be the subnet mask and how many maximum valid hosts we will have in each subnet?

Ans: For 28 Subnets, we need to borrow 5 bits, as 25 = 32 > 28

Hence, now Network Bits will be: 24 + 5 = 29 Hence Subnetting CIDR is: /29

Subnet Mask /29 = 255.255.255.248

Host Bits will be: 32 – 29 = 3

Hence, maximum number of Valid host address = 23 – 2 = 8 – 2 = 6

**Topic 4: Routing Algorithms**

1. What Is Hybrid Routing Protocol?

Answer :A Hybrid Routing protocol takes the advantages of both Distance Vector and Link State Routing protocols. it sends traditional Distance Vector updates.

lt has Link State characteristics also which means it synchronizes routing tables between neighbors at startup, and then it sends specific updates when network topology changes.

Example:- Enhanced Interior Gateway Routing Protocol (EIGRP)

2. What Is Link-state Routing Protocol?

Answer :Each router running a link state routing protocol originates information about the router, its directly connected links, and the state of those links. This information is sent to all the routers in the network as multicast messages.

Link-state routing always try to maintain full networks topology by updating itself incrementally only when network topology changes. Example:- Open Shortest Path First (OSPF)

3. What Is Distance-vector Routing Protocol?

Answer : Distance vector routing protocols use the distance or hops as metric to find paths to destinations.

Example:- Routing Information Protocol (RIP), Interior Gateway Routing Protocol (IGRP)

4. What Is Routing Protocol?

Answer : Routing Protocols learn the routes and provide the best routes from one network to another network.

Example - RIP (Routing Information Protocol) , EIGRP (Enhanced Interior Gateway Routing Protocol) and OSPF (Open Shortest Path First).

5. What Is A Dynamic Routing?

Answer : In Dynamic routing, routes are learned by using a routing protocol. Routing protocols will learn about routes from other neighboring routers running the same routing protocol. Example - OSPF, EIGRP, RIP.

6. What Is Default Route?

Answer :A default route specifies a path that the router should take if the destination is unknown. All the lP datagrams with unknown destination address are sent to the default route.

7. Define Static Routing?

Answer :In Static routing routes are manually configured on the router by a network administrator.

Static routing has the following Advantages -

There is no overhead on the router Cpu.

There is no bandwidth usage between routers.

lt is secure as the administrator can choose to allow routing access to certain networks only.

Static routing has the following Disadvantages -

The administrator must really understand the internetwork and how each router is connected in order to configure routes correctly.

lt is not feasible in large networks because maintaining it is a full-time job

**Topic 5: Link Layer: Introduction**

1. What is a Link?

A link refers to the connectivity between two devices. It includes the type of cables and protocols used for one device to be able to communicate with the other.

2. What is NIC?

NIC is short for Network Interface Card. This is a peripheral card that is attached to a PC in order to connect to a network. Every NIC has its own MAC address that identifies the PC on the network.

3. What are MAC addresses?

MAC, or Media Access Control, uniquely identifies a device on the network. It is also known as a physical address or an Ethernet address. A MAC address is made up of 6-byte parts

**Topic 6: Error Detection and Correction Techniques**

1. How many layers can provide error detection and correction?

The Transport Layer and Data Layer can provide error detection and correction at the different levels of data transmission. I will accept 3 layers as a correct answer too as the Network layer can also correct errors if it detects them.

2. What is error detection and correction in data link layer?

Error detection − Error detection involves checking whether any error has occurred or not. The number of error bits and the type of error does not matter. Error correction − Error correction involves ascertaining the exact number of bits that has been corrupted and the location of the corrupted bits

3. Which is the most efficient error correction method?

The best-known error-detection method is called parity, where a single extra bit is added to each byte of data and assigned a value of 1 or 0, typically according to whether there is an even or odd number of "1" bits.

4. What are the error detection techniques?

• Simple Parity check.

• Two-dimensional Parity check.

• Checksum.

• Cyclic redundancy check.

5. What type of error is not detected by CRC?

What kind of errors does CRC cannot detect? Multiple burst errors where the total distance of the bursts spans more than 16 bits, essentially a single burst error more than 16 bits long. Some patterns of 4 or more randomly distributed bit errors will fail to be detected.

**Topic 7: Switched local area Networks**

1. What Is The Use Of Arp?

Answer :A host in an Ethernet network can communicate with another host, only if it knows the Ethernet address (MAC address) of that host. The higher level protocols like IP use a different kind of addressing scheme (like IP address) from the lower level hardware addressing scheme like MAC address. ARP is used to get the Ethernet address of a host from its IP address. ARP is extensively used by all the hosts in an Ethernet network.

2. Why A Ip Address Needs To Be Mapped To A Mac Address, Why Can't The Mac Address Itself Is Represented Using The Ip Address?

Answer : The length of a MAC address is 6 bytes and the length of an IP address is 4 bytes. Obviously, the MAC address cannot be represented using the IP address. So an IP address must be mapped to the corresponding MAC address.

3. Can Arp Be Used In A Network Other Than Ethernet?

Answer : ARP is a general protocol, which can be used in any type of broadcast network. The field in the ARP packet specifies the type of the MAC address and the type of the protocol address. ARP is used with most IEEE 802.x LAN media. In particular, it is also used with FDDI, Token Ring, and Fast Ethernet, in precisely the same way as it is with Ethernet.

4. How Does Arp Resolve An Ip Address To An Ethernet Mac Address?

Answer :When ARP needs to resolve a given IP address to Ethernet address, it broadcasts an ARP request packet. The ARP request packet contains the source MAC address and the source IP address and the destination IP address. Each host in the local network receives this packet. The host with the specified destination IP address, sends an ARP reply packet to the originating host with its IP address.

5. What Happens When A Host Receives An Arp Request Packet?

Answer : The ARP request is received and processed by all the hosts in the network, since it is a broadcast packet.

The following steps are carried out when a ARP request packet is received by a host:

• If the IP address to be resolved is for this host, then the ARP module sends an ARP reply packet with its Ethernet MAC address.

• If the IP address to be resolved is for this host, then the ARP module updates its ARP cache with the source Ethernet MAC address to source IP address mapping present in the ARP request packet. If the entry is already present in the cache, it is overwritten. If it is not present, it is added.

• If the IP address to be resolved is not for this host, then the ARP module discards the ARP request packet.