# CS 5498 Theory Assignment-03.

**Ans-1** The internet is made up of millions of interconnected routers and hundreds of millions of hosts.

If all routers execute the same routing algorithm to compute routing paths through the entire network.

storing the routing information would require enormous amounts of memory. The computation time for running the shortest path algorithm would be prohibitive. Any changes of routing protocols, bug-fixes etc. would be very difficult, the hierarchical organization of the Internet solves this issue.

Routers are organised into autonomous systems (ASs) with each **AS** consisting of a group of routers that are typically under the same administrative control or belong to the network serving a particular organisation. All routers within the ~~network~~ same As have information about each other & run the same routing algorithm. This is called an intra-AS routing protocol. Each AS can choose its own intra-As routing protocol.

most ASs run RIP (distance vector) or OSPF (link-sta

As ASs need to be connected to each other one or more of the routers in an As have added task of forwarding packets to destination outside AS.

These routers are called gateway routers.

All gateway routers in the internet run a common border gateway protocol (BGP). BGP is a variant of distance vector routing with support for a variety of policy-based routing decisions.

The number of ASs today is just over 100,000. with a few gateway routers in each AS, the number of routers participating in BGP is perhaps 1 million. This is large but manageable given the CPU and RAM in a high-end router today. Thus, hierarchical organization of routers and deployment of appropriate routing protocols enables scaling of the internet as the number of users increases.

Ans:-2 Routing loop is a network problem that causes a data packet to bounce back and forth between a group of nodes, instead of arriving at destination. It occurs when a set of nodes have an inconsistent routing table. This could be caused when a routing table update does not reach to all the routers simultaneously. Following are a few mechanisms designed to avoid routing loops.

a). maximum-hop count :- maximum hop count mechanism can be used to prevent routing loops. Distance vector protocols use the TTL (Time to Live) value in the IP datagram header to avoid routing loops, when an IP datagram move from router to router, a router keeps track of the hops in the TTL field in the IP datagram

header. For each hop a packet goes through, the packet's TTL field is decremented by one. If this value reaches 0, the packet is dropped by the router that decreamented the value from 1 to 0.

(b) Split Horizon :- A split horizon is a routing configuration that stops a route from being advertised back in the direction from where it came.

(c). Hold-down timers :- This mechanism used to prevent bad routers from being restored and propogated by mistake. when a router is placed in a hold-down state, routers will neither advertise the router nor accept advertisements about it for a specific interval called the hold-down period.

ANS- 03 :-

Use ipconfig/all Command in CMD.

IPV4 address - 10.7.11.0

Link-local IPv6 address - fe80::6b:47ae:4d10:2f03%16

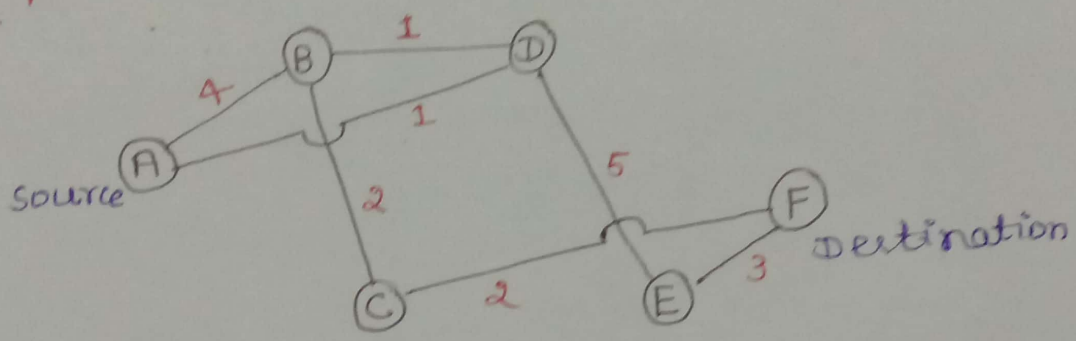
Subnet mask - 255.255.0.0

Default Gateway - 10.7.0.1

DHCP Server - 10.7.0.1

DNS Server - 10.7.0.1

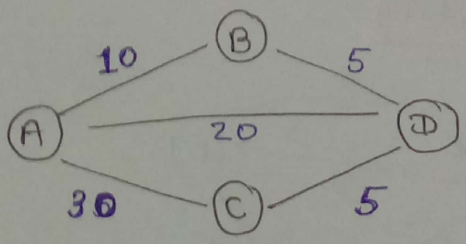
Ans: 4 -




sol:-

| | Q | D(V) | Prev(V) |
|---|---|---|---|
| | A, B, C, D, E, F | A=0, *=∞ | |
| A | B, C, D, E, F | D=1, B=4 | D(A), B(A) |
| D | B, C, E, F | B=2, E=6 | B(D), E(D) |
| B | C, E, F | C=4, E=6 | C(B), E(D) |
| C | E, F | E=6, F=6 | E(D), F(C) |
| E | F | F=6 | F(C) |

ANS : 5 :-




Sol:-

**T=0**

At A

| | A | B | C | D |
|---|---|---|---|---|
| A | 0 | 10 | 30 | 20 |
| B | – | – | – | – |
| C | – | – | – | – |
| D | – | – | – | – |

At B

| | A | B | C | D |
|---|---|---|---|---|
| A | – | – | – | – |
| B | 10 | 0 | ∞ | 5 |
| C | – | – | – | – |
| D | – | – | – | – |

At C

| | A | B | C | D |
|---|---|---|---|---|
| A | – | – | – | – |
| B | – | – | – | – |
| C | 30 | ∞ | 0 | 5 |
| D | – | – | – | – |

At D

| | A | B | C | D |
|---|---|---|---|---|
| A | – | – | – | – |
| B | – | – | – | – |
| C | – | – | – | – |
| D | 20 | 5 | 5 | 0 |

**T=1**

| | A | B | C | D |
|---|---|---|---|---|
| A | 0 | 10 | 20 | 15 |
| B | 10 | 0 | ∞ | 5 |
| C | 30 | ∞ | 0 | 5 |
| D | 20 | 5 | 5 | 0 |

| | A | B | C | D |
|---|---|---|---|---|
| A | 0 | 10 | 30 | 20 |
| B | 10 | 0 | 10 | 5 |
| C | – | – | – | – |
| D | 20 | 5 | 5 | 0 |

| | A | B | C | D |
|---|---|---|---|---|
| A | 0 | 10 | 30 | 20 |
| B | – | – | – | – |
| C | 20 | 10 | 0 | 5 |
| D | 20 | 5 | 5 | 0 |

| | A | B | C | D |
|---|---|---|---|---|
| A | 0 | 10 | 30 | 20 |
| B | 10 | 0 | ∞ | 5 |
| C | 30 | ∞ | 0 | 5 |
| D | 15 | 5 | 5 | 0 |

**T=2**

| | A | B | C | D |
|---|---|---|---|---|
| A | 0 | 10 | 20 | 15 |
| B | 10 | 0 | 10 | 5 |
| C | 20 | 10 | 0 | 5 |
| D | 15 | 5 | 5 | 0 |

| | A | B | C | D |
|---|---|---|---|---|
| A | 0 | 10 | 20 | 15 |
| B | 10 | 0 | 10 | 5 |
| C | – | – | – | – |
| D | 15 | 5 | 5 | 0 |

| | A | B | C | D |
|---|---|---|---|---|
| A | 0 | 10 | 20 | 15 |
| B | – | – | – | – |
| C | 20 | 10 | 0 | 5 |
| D | 15 | 5 | 5 | 0 |

| | A | B | C | D |
|---|---|---|---|---|
| A | 0 | 10 | 20 | 15 |
| B | 10 | 0 | 10 | 5 |
| C | 20 | 10 | 0 | 5 |
| D | 15 | 5 | 5 | 0 |