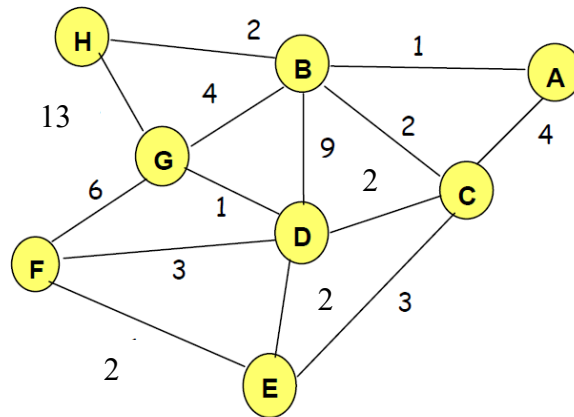


# Assignment 1 of EE3315 2021-2022 Semester B

**Question 1.** Consider the following network:

**[20 marks]**



The number on each link represents the cost of using this link. In your answer sheet, draw down the network. Using Dijkstra's algorithm, compute the shortest path from **Node E** to all network nodes. If there is a tie, ***break it in favor of leftmost column***. List the shortest paths from Node E to all the other nodes and specify their costs. Let

- $D(v)$ : cost of the least-cost path from source to destination  $v$ .
- $P(v)$ : previous node (neighbour of  $v$ ) along the current least-cost path
- $N$ :  $v$  is in  $N$  if the least-cost path from source to  $v$  is known.

[illegible]

**Question 2.** Consider the Distance-Vector update shown in the Fig. Q.2 below. It shows an existing table (i) in a gateway K, and update message (ii) from another gateway J. Assuming that the distance between gateways K and J is 3, write down the changes table (i) due to the update and give the reasons for those changes. **[15 marks]**

Destination	Distance	Route
Net 1	0	Direct
Net 2	0	Direct
Net 4	8	Gate L
Net 16	9	Gate M
Net 24	8	Gate J
Net 40	5	Gate Q
Net 43	4	Gate J

(i) An existing routing table for a gateway K

Destination	Distance
Net 1	2
Net 4	8
Net 6	7
Net 16	7
Net 24	2
Net 40	8
Net 43	2

(ii) An incoming routing update message from gateway J.

Figure Q.2

**Question 3.** In Figure Q.3, assume that link BC has gone down for a long time. Assume A, B and D use split horizon with Poisoned Reverse. [26 marks]

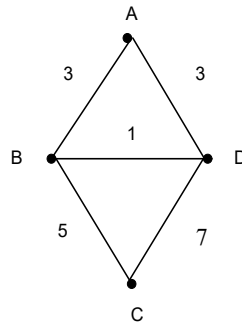


Figure Q.3

- i. What distance to C will D report to A?
- ii. What distance to C will D report to B?
- iii. What distance to C will B report to A?
- iv. What distance to C will B report to D?

Now, suppose link CD goes down.

- v. What is the distance to C that D reports to A?
- vi. At the same time, what distance to C will B report to A?
- vii. At the same time, what is the distance to C that A reports to B?
- viii. At the same time, what is the distance to C that D reports to B?
- ix. What does A then think the shortest path to C is?
- x. What does A then tell B about its distance to C?
- xi. What does A then tell D about its distance to C?
- xii. What is D's route to C now?
- xiii. What does D then tell B the distance to C?

**Question 4.**

[16 marks]

Initially, we have the following distance vectors for the network in Figure Q4

Distance vector of y: (6, 0, 5)

Distance vector of x: (0, 6, 11)

Now link cost of y-z changes from 5 to 44. Using Distance Vector routing algorithm, write down the steps showing that node y and node x update their distance vectors until the routing algorithm converges.

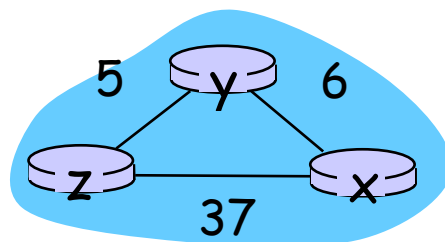
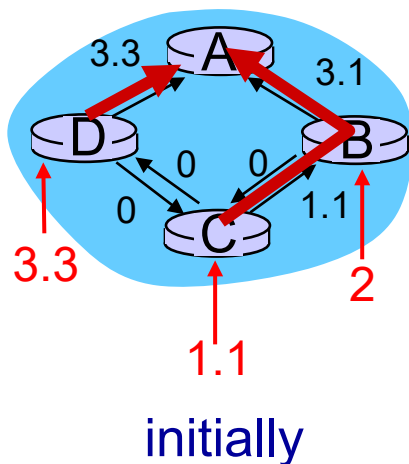


Figure Q.4

**Question 5.****[15 marks]**

Let link cost be equal to the amount of carried traffic in a link. Let the traffic from node B, node C and node D to node A be 2 unit, 1.1 unit and 3.3 unit, respectively. According to the routing decision initially given by the following figure, draw down three corresponding figures if we use Link State routing algorithm three times to find new shortest paths to node A resulting in new costs.

**Question 6.****[8 marks]**

In Figure Q.6, we assume that A, B, C are provider networks and X, W, Y are customers of provider networks. In addition, Border Gateway Protocol (BGP) is used between networks. State whether the following statements are true or false. Explain your answer.

- i) B is not willing to advertise to A the path BX.
- ii) W is not willing to advertise to A a route to C.
- iii) A is not willing to advertise to C the path ABX.
- iv) A is not willing to advertise to W the path ABX.

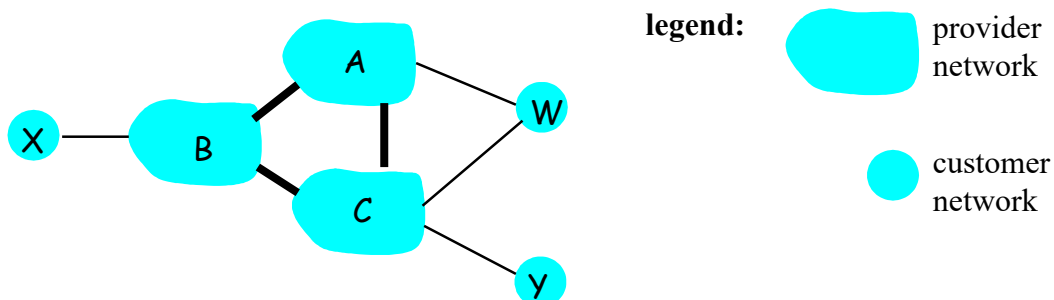


Figure Q.6 : A simple BGP scenario