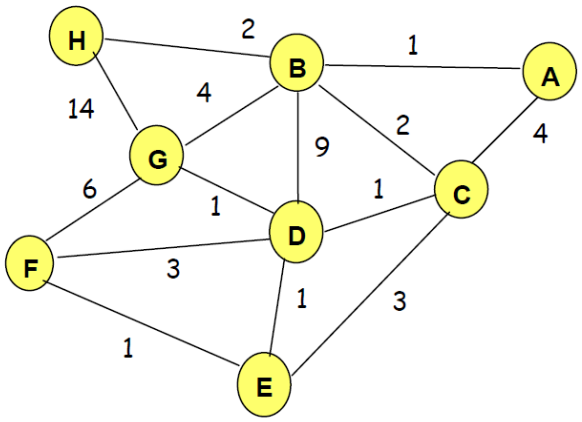
Answer for EE3315 Test 1 2018-2019

Question 1. Consider the following network: [20 marks]



Say that the number on every link represents the cost of using this link. If **the cost of using the link between Node E and Node D is changed from 1 to 8**, using Dijkstra's algorithm, compute the shortest path from **Node E** to all network nodes. Use the table form below, but work out the results in your answer sheet. If there is a tie, ***break it in favor of rightmost column***. List out all the shortest paths from Node E to all the other nodes.

N	A	B	C	D	F	G	H
E	∞	∞	3, E	8, E	1, E	∞	∞
E,F	∞	∞	3, E	4, F		7, F	∞
E,F,C	7, C	5, C		4, F		7, F	∞
E,F,C,D	7, C	5, C				5, D	∞
E,F,C,D,G	7, C	5, C					19, G
E,F,C,D,G,B	6, B						7, B
E,F,C,D,G,B,A							7, B
E,F,C,D,G,B,A,H							

The shortest path from Node E to
A; ECBA
B: ECB
C: EC
D: EFD
F: EF
G: EFDG
H: ECBH

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. Write down the changes in the table and give the reasons for those changes. Assume that the distance between gateways K and J is 2. [8 marks]

Destination	Distance	Route
Net 1	0	Direct
Net 2	0	Direct
Net 17	2	Gate J
Net 18	5	Gate M
Net 24	5	Gate Q
Net 30	6	Gate M
Net 42	5	Gate J

(i) An existing routing table for a gateway K

Destination	Distance
Net 1	3
Net 4	8
Net 17	4
Net 18	4
Net 24	5
Net 30	2
Net 42	5

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

Figure Q.2

Destination	Distance	Route
Net 4	10	Gate J
Net 17	6	Gate J
Net 30	4	Gate J
Net 42	7	Gate J

Figure Q.2-1

For destination Net 4, it updates that a new route is setup via gateway J.
For destination Net 17, it updates that if passing via gateway J, it will take longer route.
For destination Net 30, it updates that a shorter distance resulting from routing via gateway J.
For destination Net 42, it updates that if passing via gateway J, it will take longer route.

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]

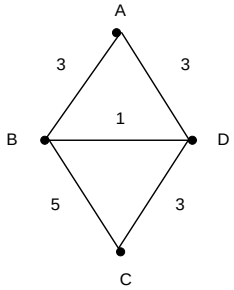
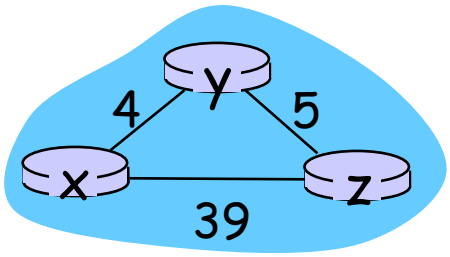


Figure Q.3

i. What distance to C will A report to D? ∞
ii. What distance to C will B report to D? ∞
iii. What distance to C will D report to A? 3
iv. What distance to C will D report to B? 3

Now, suppose link CD goes down.
v. What distance to C will D report to B? ∞
vi. At the same time, what is the distance to C that A reports to D? ∞
vii. At the same time, what is the distance to C that A reports to B? 6
viii. At the same time, what is the distance to C that B reports to D? ∞
ix. What does B then think the shortest path to C is? B-A-D-C
x. What does B then tell D about its distance to C? 9
xi. What does B then tell A about its distance to C? ∞
xii. What is D's route to C now? D-B-A-D-C
xiii. What does D then tell A the distance to C? 10

Question 4. Initially, we have the following distance vectors for the network below
Distance vector of y: (4, 0, 5)
Distance vector of z: (9, 5, 0)
Now link cost of y-x changes from 4 to 36. Using Distance Vector routing algorithm, write down the steps showing that node y and node z update their distance vectors until the routing algorithm converges. [16 marks]



Answer for Question 4:
1. y updates its vector:
   Dist. vector y: (14, 0, 5)
2. z updates its vector:
   Dist. vector z: (19, 5, 0)
3. y updates its vector:
   Dist. vector y: (24, 0, 5)
4. z updates its vector:
   Dist. vector z: (29, 5, 0)
5. y updates its vector:
   Dist. vector y: (34, 0, 5)
6. z updates its vector:
   Dist. vector z: (39, 5, 0)
7. y updates its vector:
   Dist. vector y: (36, 0, 5)
8. z updates its vector:
   Dist. vector z: (39, 5, 0)

Question 5. Figure Q5 shows a network using Hierarchical Routing. Draw down the topology of the network from Node 2C's point of view under the use of Hierarchical Routing. Write down the routing table for node 2C under Hierarchical Routing. Note that for each destination, "next hop" and "number of hops" (to that destination) should be included. [8 marks]

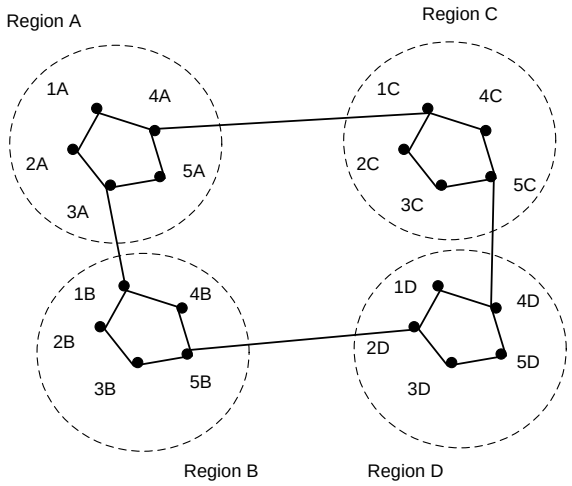
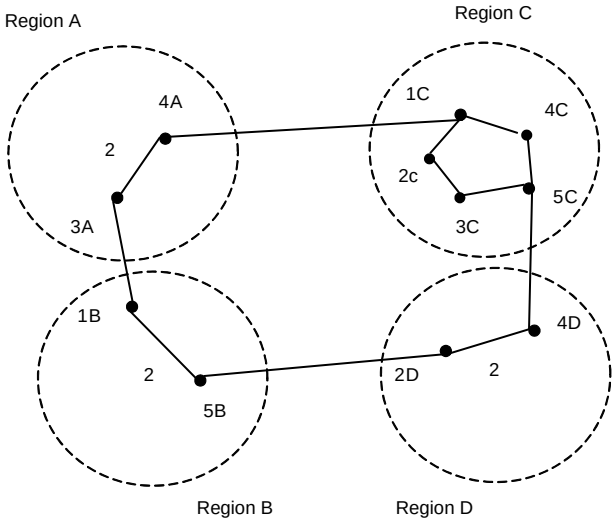


Figure Q5



Routing table for 1C

Destination	Next Hop	No. of Hops
2C	-	-
1C	1C	1
3C	3C	1
4C	1C	2
5C	3C	2
A	1C	2
B	1C	5
D	3C	3

Question 6. Referring to Figure Q6, what is the path used (a) from 1a to 5a (b) from 1a to 6a, respectively, using the following routing algorithms? [12 marks]

1. The shortest path routing
2. The hot potato routing (with the shortest path routing outside AS1)
3. BGP routing with the elimination rules:
   i. shortest AS-PATH
   ii. shortest path to NEXT-HOP

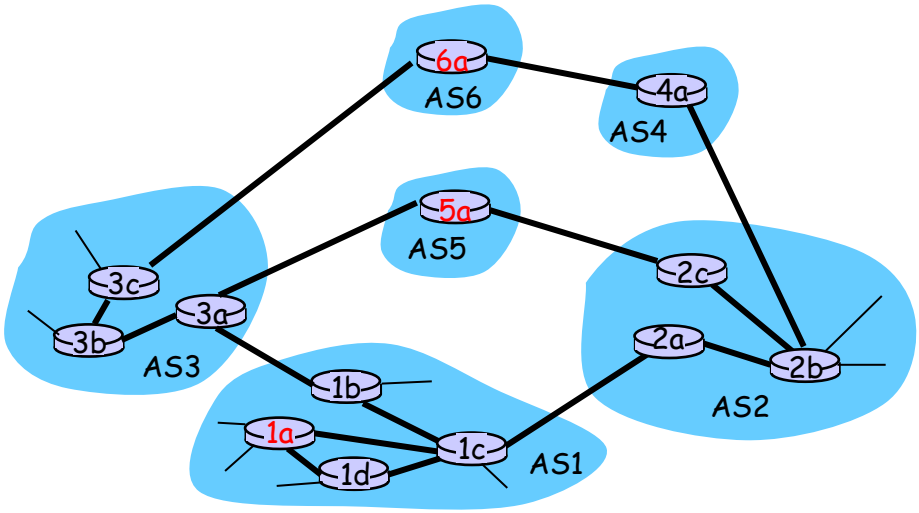


Figure Q6

(a) From 1a to 5a

1. 1a-1c-1b-3a-5a
2. 1a-1c-2a-2b-2c-5a
3. 1a-1c-2a-2b-2c-5a

(b) From 1a to 6a

1. 1a-1c-2a-2b-4a-6a
2. 1a-1c-2a-2b-4a-6a
3. 1a-1c-1b-3a-3b-3c-6a

Question 7. In Figure Q.7, 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. [10 marks]

i) W is willing to advertise to A a route to C.
ii) A is willing to advertise to C the path ABX
iii) B is willing to advertise to A the path BX
iv) A is willing to advertise to W the path ABX
v) C is willing to advertise to A the path CBX

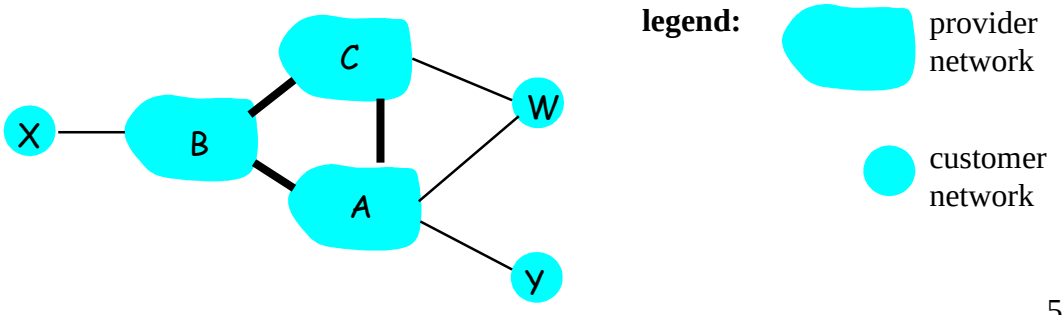


Figure Q.4 : A simple BGP scenario

i) False. W does not want to route from A via W to C since W gets no “revenue” for that.

ii) False. A gets no “revenue” for routing ABX since neither X nor B are A’s customers

iii) True. B gets “revenue” for routing ABX since X is B’s customer.

iii) True. A gets “revenue” for routing WABX since W is A’s customer.

iv) False. C gets no “revenue” for routing ACBX since neither X nor A are C’s customers

- END -